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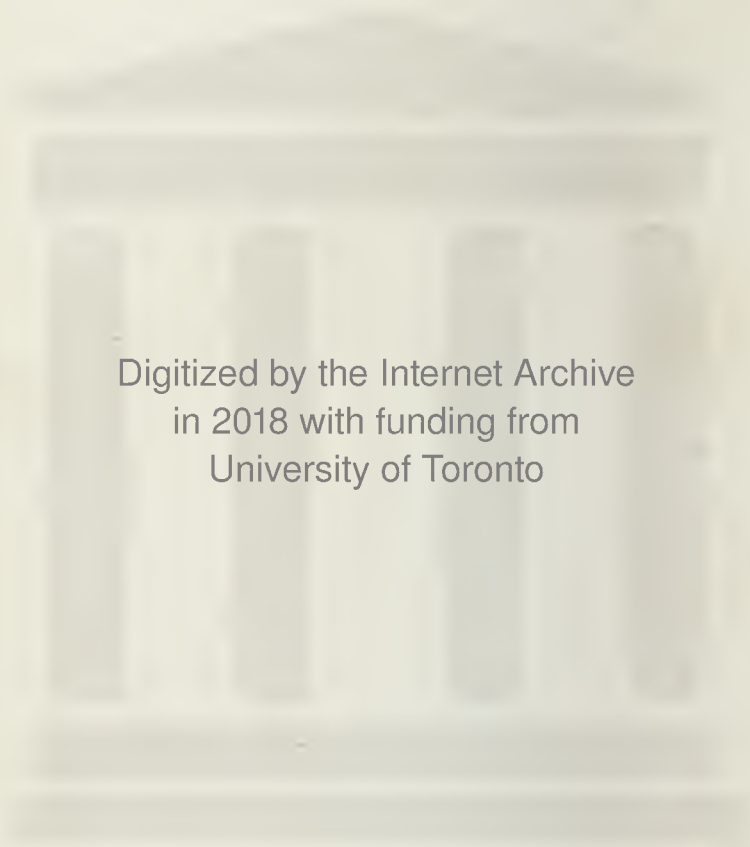
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SKETCHES IN NATURAL HISTORY.

HISTORY

OF

THE MAMMALIA.

VOL. I.

ORDER—CARNIVORA:

FAMILIES—FELIDÆ AND URSIDÆ.

ORDER—MARSUPIALIA.

WITH NUMEROUS ILLUSTRATIONS.

IN SIX VOLUMES.

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S K E T C H

OF THE

HISTORY OF THE MAMMALIA.

IN previous volumes we have given a full account of 'The Elephant,' 'The Horse,' and 'The Dog;' the importance of these animals in the service of man, and the interest attached to the account of them, justified, as we thought, the devotion of a volume to each. To the 'History of the Monkey Tribe' we have also given a volume; and we now propose, in as short a compass as possible, to complete a 'Sketch of the History of the Mammalia.' Though we shall treat each family distinctly, convenience of arrangement into volumes will not allow of our preserving the scientific order, and we therefore give the following summary, which may not be devoid of utility. Our volumes, however, will not, of course, treat of the first order of the class—Man.

Class MAMMALIA.

A. Subclass *Placentaia*.

Orders.

1. Bimana :—Man.
2. Quadrumana :—Apes, Monkeys, Lemurs.
3. Cheiroptera :—Bats.
4. Carnivora :—divided into
 - Felidæ :—Cat tribe.
 - Mustelidæ :—Weasel tribe, Otters, &c.
 - Viverridæ :—Viverrine tribe, Civet, Genet, Ichneumons.

Orders.

4. Carnivora—*continued*.

Hyænidæ :—Hyænas.

Canidæ :—Dog tribe.

Ursidæ :—Bear tribe.

Phocidæ :—Seals.

5. Insectivora :—Shrews, Moles, Hedgehogs.

6. Cetacea :—Whales, Grampus, Porpoise.

7. Pachydermata :—

Terrestrial :—Elephant, Rhinoceros.

Aquatic :—Dugong, Manatee, &c.

8. Ruminantia :—Oxen, Deer, Antelopes, Sheep.

9. Rodentia :—Hares, Rats, Porcupines, &c.

10. Edentata :—Sloth, Armadillo, Manis, Ant-eater.

B. Subclass *Implacentalia* (Marsupialia, Auct.).

11. Marsupialia :—Kangaroo, Opossum, Wombat.

12. Monotremata :—Ornithorhynchus, Echidna.



ORDER.—CARNIVORA.

FAMILY.—FELIDÆ.

IN this family group, which scarcely admits of any generic subdivisions, are comprehended the most sanguinary, the most formidable, and the most typical of the order Carnivora. That is to say, in these animals the organs of destruction exhibit the highest degree of development. Among quadrupeds they are what the eagles and falcons are among birds.

Essentially carnivorous, still, unlike the dog, which relishes carrion, they reject putrescent flesh, and consequently are more expressly endowed and fitted for the work of wholesale slaughter. Their instincts and powers are, in fact, in admirable accordance. Their frame is vigorous, but agile,—their limbs are short, the joints well-knit, but supple, and every motion is easy, free, and graceful. They leap and bound with astonishing

velocity. Their footfall is silent, the feet being provided with elastic pads, namely, a large basal ball or cushion, and one under each toe. (Fig. 1.) The claws are of

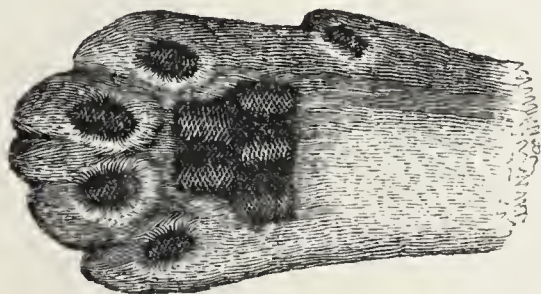


Fig. 1.

enormous size, hooked, and sharp, and when not in use completely retracted within a sheath, so as not to be visible. These, indeed, and the teeth, are the instruments of their destructive energy.

The dentition of the Felidæ is very characteristic. The incisors are very small, six above and six below. The canines are of enormous size and strength; the false molars are sharp and compressed; above there are two on each side,—the first small, the second long and conical. This is followed by the laniary molar (carnassière), which is bicuspid with an inner blunt tubercle; behind the laniary is a very minute tuberculous molar, but this is wanting in the lower jaw, and the laniary is bicuspid.

Dental formula.—(Figures 2, 3, 4.)

$$\text{Incisors } \frac{6}{6}, \text{ canines } \frac{1-1}{1-1}, \text{ molars } \frac{4-4}{3-3}.$$

The shortness of the muzzle and the boldness of the occipital ridge give an appearance to the skulls of the Felidæ as if they were drawn out backwards; the forehead has no sudden rise, but is continued from the nasal bones to the occiput in a gradual arch. The union of the interparietal and occipital ridges forms a beetling promontory (to which is attached the ligamentum nuchæ), overhanging the occipital bone, which has a



Fig. 2.



Fig. 3.

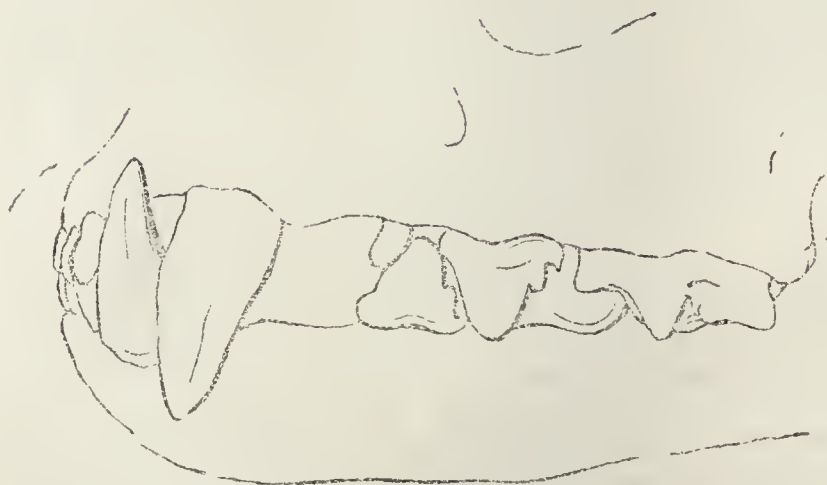


Fig. 4.

perpendicular, and even inwardly inclined direction; so that the back of the skull appears abruptly truncate. The orbits are large, of a somewhat oval form, and obliquely situated. The outer ring is incomplete, excepting, as far as we ourselves have examined, in one species, the *Felis planiceps* of Sumatra, in which, as in the ichneumons, it is a fair circular ring; indeed, the skull of this species (of which we have only seen a single specimen) we considered as approaching in its contour to that of some of the Viverræ. The tympanic bulla, enclosing the internal organs of hearing, is largely developed. In the *Felis planiceps* it is of peculiar magnitude.

The bold ridges, and the strength and form of the zygomatic arches, indicate the immense volume and

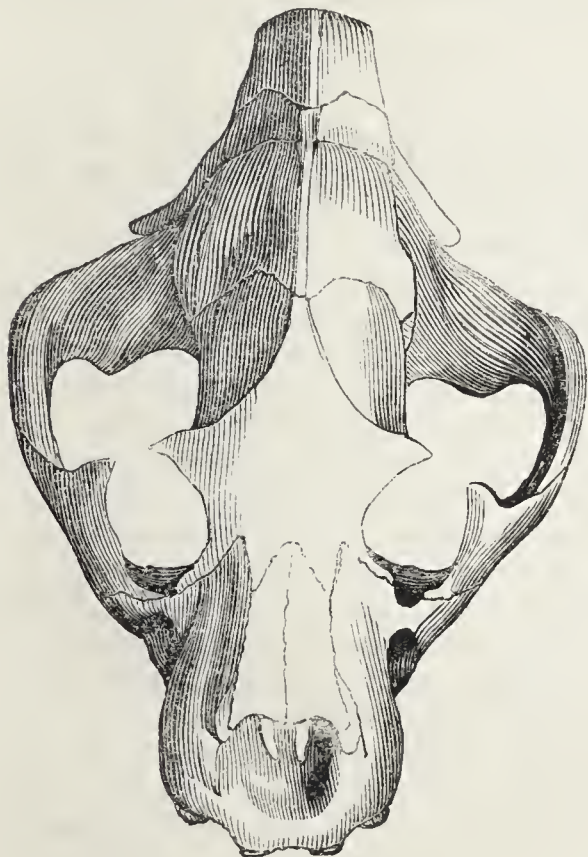


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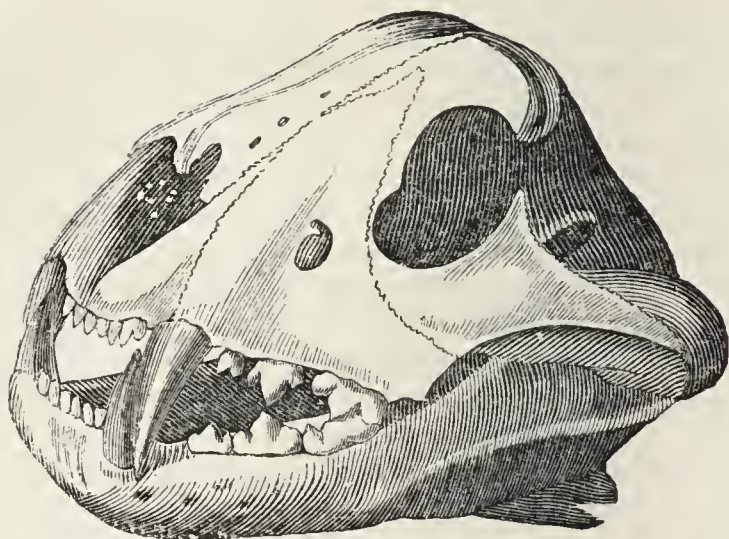


Fig. 6.

stress of the muscles destined to act upon the lower jaw. The articulating condyles are not raised above the straight horizontal line carried along the sides of the lower jaw; they are cylindrical, and firmly locked in the transversely elongated glenoid cavities, the margins of which are so elevated before and behind as to render any but a simple hinge-like motion impossible. This scissor-like action of the lower jaw is in accordance with the trenchant character of the molar teeth, the mutual action of which on each other resembles that of the blades of a pair of shears. (Figures 5, 6, 7.)

The skulls of the Felidæ exhibit a general sameness of contour; the principal difference being that of size, according to the species. The ocelot has, perhaps, the most rounded skull, while that of the *Felis planiceps* is flattened between the orbits and narrow. Those of the lion and tiger are very similar, and not easy to be discriminated from each other. There is greater straightness in the longitudinal outline of the upper surface in that of the lion; greater flatness of the space between the orbits; and the infra-orbital foramina are larger and often double. The following character, first noticed

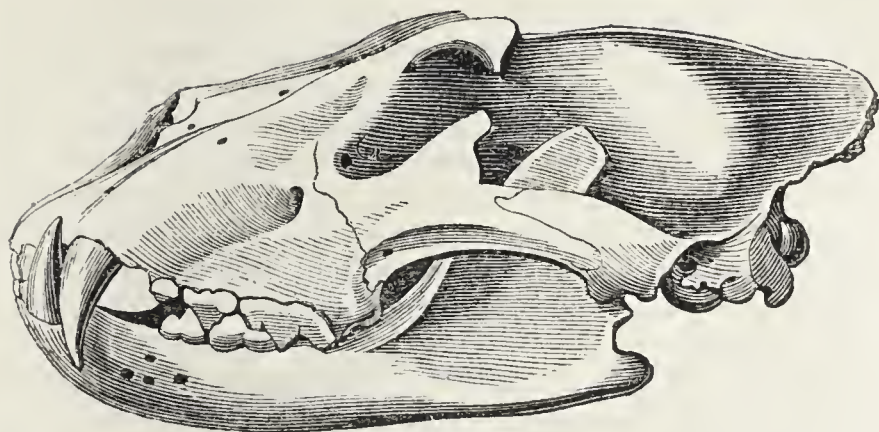


Fig. 7.

by Professor Owen, appears to be an unfailing criterion :— In the tiger, the nasal processes of the maxillary bones never extend upwards as far as the union of the nasal bones with the frontal, failing by the third of an inch ; while in the lion, the nasal processes of the maxillary bones always attain the line of union between the nasal and frontal bones, and sometimes even pass beyond it.

In the limbs of the Felidæ we behold the finest display of muscular development which can be conceived. The dissected arm of a lion or tiger is a subject worthy the study of an artist. Hence to dash down their prey is an easy task. It has been said that the Bengal tiger has been known to fracture the skull of a man with one stroke of its heavy paw. We may easily conceive the force of the muscles destined to act on the claws or talons to which we have already alluded. There are five toes on the anterior, and four on the posterior extremities ; and these are armed with the formidable weapons in question. By a beautiful structural conformation of the bones, ligaments, and muscular parts, they are always preserved without effort from coming in contact with the ground, and are retracted within a sheath, so as to be kept sharp and ready for service.

This involuntary retraction, counteracted only by the action of muscles, is effected by two elastic ligaments so contrived so as to roll back the ultimate

phalanx which the claw encases, and bring it down by the outer side of the penultimate phalanx, which is flattened off to remove every obstruction. From this position the talon can be thrown forward in a moment, the action of the double elastic spring being counteracted by that of the flexor muscles. In the act of striking with great violence, the flexor muscles strongly contract, brace up the tendon, and throw out the talon, which, when the act is over, returns to its sheath. An analogous arrangement exists in the claws of the sloth. Its hooks, as they may be termed, are governed by an elastic ligament, but its tendency, contrary to what we see in the cat tribe, is to press them towards the palm, in order to enable the animal to cling without fatigue to the branches from which it suspends itself. In Figure 8,

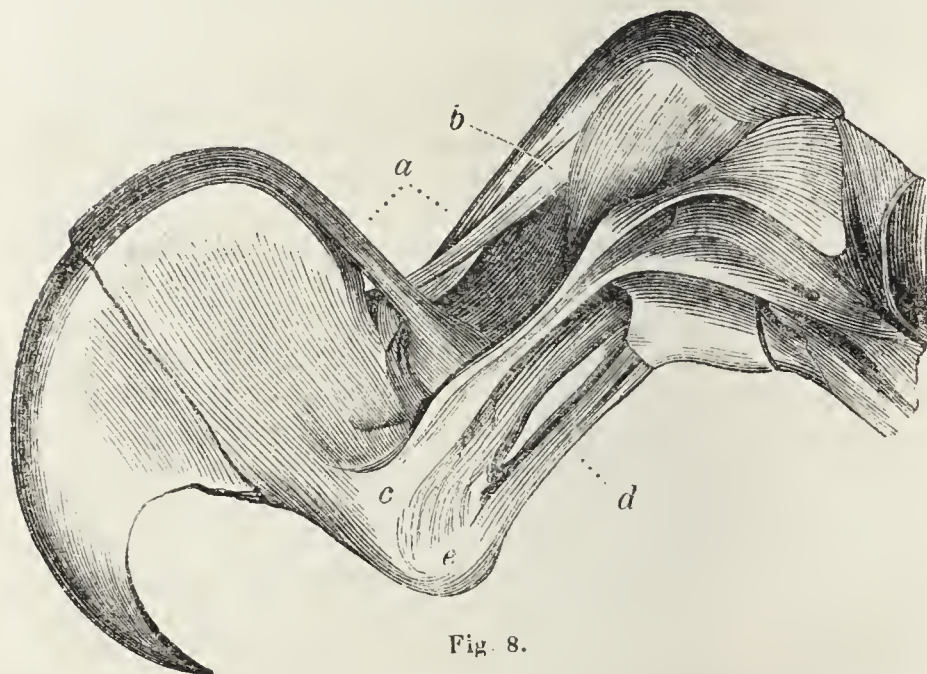


Fig. 8.

which is a toe from the left foot of a young lion represented in a state of extension, *a* points to the two elastic ligaments; *b* the tendon of the extensor muscle; *c* a slip of inelastic tendon; *d* the tendon of the flexor muscle which passes over the upper extremity of the last phalanx

at *e*, as over a pulley, and thus assists the powerful action of that muscle.

In Figure 9, a toe from the hind foot, the two elastic ligaments (*a*) converge to be inserted into the upper angle of the last phalanx, and draw it backwards upon, instead of by the side of, the penultimate phalanx. *c* is a slip of the lateral inelastic tendon, and *d* the tendon of the flexor profundus, which is strongly strapped down by an annular ligament *e*.

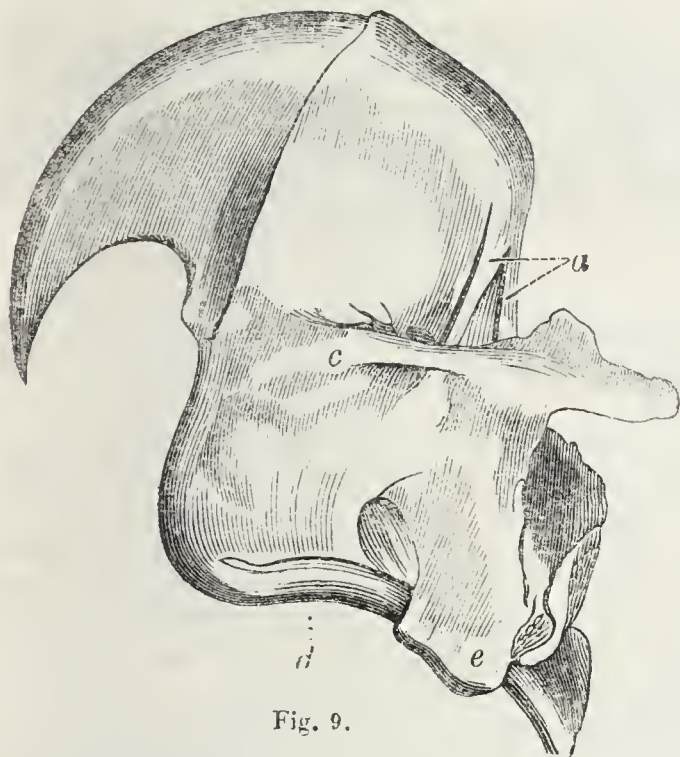


Fig. 9.

Figures 10 and 11 are also illustrative of the mechanism described.

Figure 10, *a* second phalanx of a toe; *b* the last phalangeal bone: *c* an elastic ligament.

Figure 11, *a* and *b* the extremities of the two bones of the fore-arm; *c c* the carpal or wrist bones; *d d* the metacarpal bones; *e e* the first row of phalangeal bones; *f f* the second row of phalangeal bones; *g g* the last row encased with the claws.

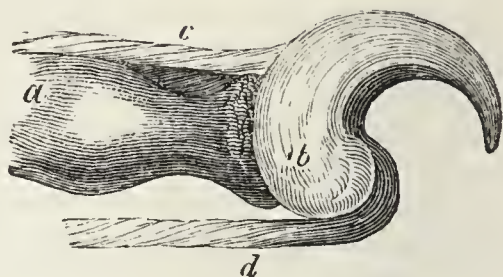


Fig. 10.

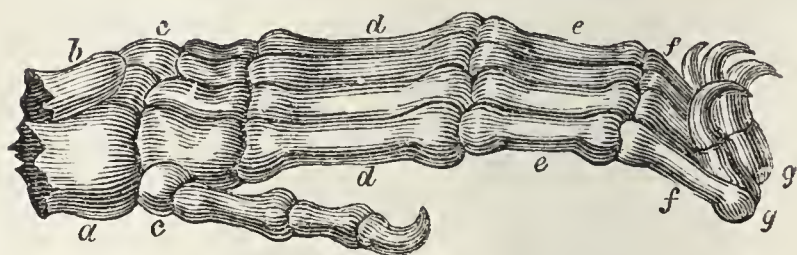


Fig. 11.

The general skeleton of the Felidæ, as exemplified by that of the lion (Figure 12), will claim a moment's notice.

The back and loins are long; the vertebræ of the neck are remarkably large and solid, the first or atlas having its lateral processes flat and expanded; the spinous processes of the dorsal vertebræ are long, with the exception of the last two or three; the transverse processes of the lumbar vertebræ are large; the spinous processes are broad, but rather short, and inclined gently forwards, but become, as they advance to those of the dorsal vertebræ, more upright, while, on the other hand, those of the dorsal in descending lose their obliquity; the chest is deep; the scapula is broad, with a high strong spine; the clavicle is small, and merely imbedded in the muscles of the shoulder; the humerus is short and stout; it is remarkable for a high ridge or crest, which rises above the outer condyle of its lower articulation. Above the inner condyle there is an orifice for the passage of the artery, which does not run round the bone, but, as it were, pierces it in a direct course onwards. This orifice is found not only in all the Felidæ, but in some of the

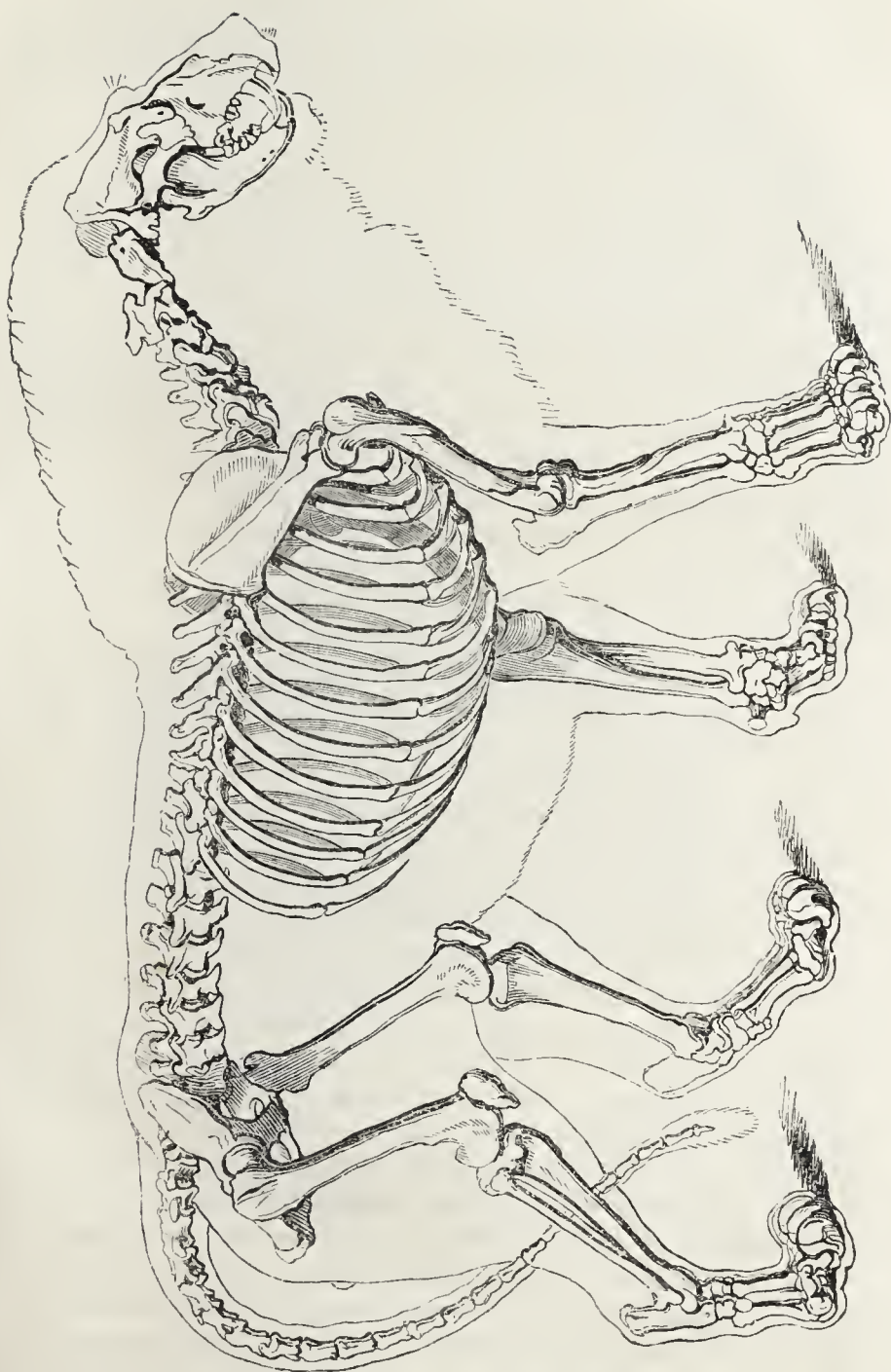


Fig. 12.

American monkeys, in the seals, the badgers, the coatis, the racoons, the mustelæ, the civets, the ichneumons, and others, but not in the dog, the hyæna, or the bear.

With respect to the perfection of the senses in the Felidæ, a few words may be necessary.

Sight.—The sense of sight is very acute, and adapted not only for diurnal, but also for nocturnal vision. The eyes are placed obliquely, and glare in the dark, owing to the brilliancy of the tapetum lucidum, a concave mirror at the bottom of the eye.

This glare is visible even during the day, especially when the animals are enraged, for the pupil dilates under excitement. In the smaller cats the pupil is vertically linear when contracted, but in the larger, as the lion, tiger, leopard, cheetah, jaguar, &c., it is circular.

Hearing.—The sense of hearing is exquisite, and the auditory apparatus is accordingly developed. We have already noticed the magnitude of the tympanic bulla.

Smell.—This sense is also in great perfection, and the olfactory apparatus is complicated, and abundantly supplied with nerves. The Felidæ are, however, less distinguished for the sense of smell than the canine race.

Taste.—The sense of taste is not very refined. The tongue is rough. The roughness of the tongue of the common cat is familiar to every one, as well as the action of lions and tigers in licking the bones of their prey in order to scrape off the adherent particles of flesh. This is effected by numerous horny papillæ, differently arranged in different species, but always with the points directed backwards. Figure 13 shows these papillæ on the lion's tongue; and Figure 14 a magnified view of them on a small portion.

Feeling.—The long bristles called *whiskers* on each side of a cat's mouth are familiar to all: these are important organs of touch. They are attached to a bed of close glands under the skin, and each is connected with a nerve. Hence they communicate to the animal an impression from the slightest touch. If we imagine a lion or tiger stealing through a jungle during the darkness

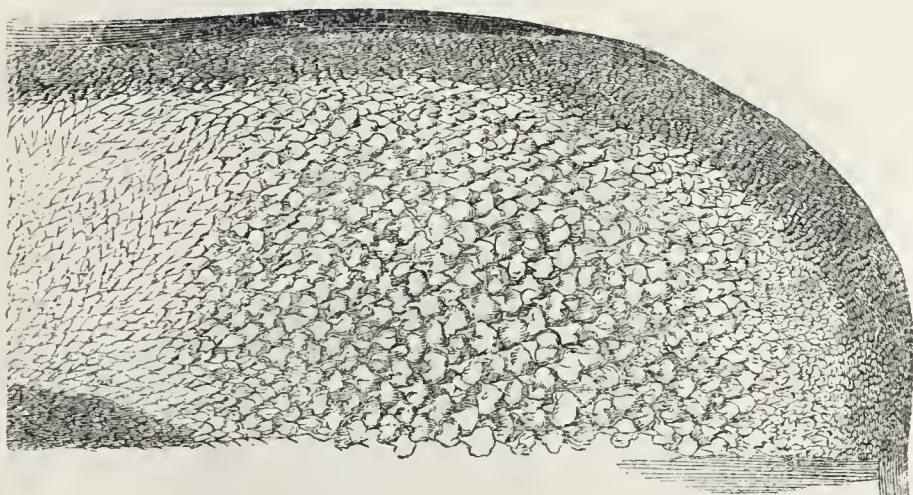


Fig. 13.

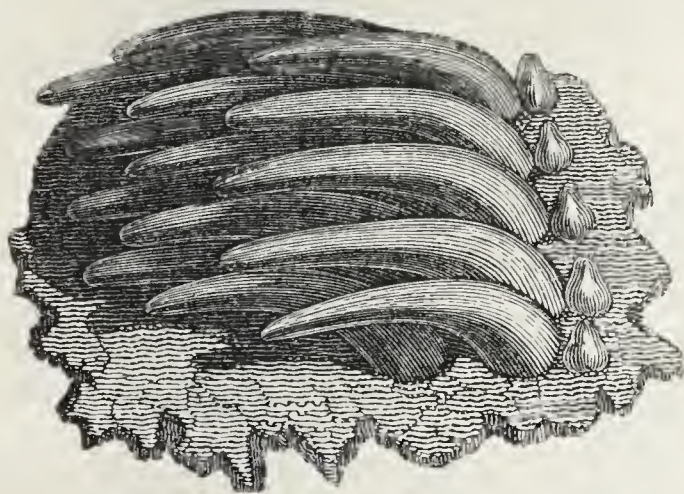


Fig. 14.

of night, we shall be able to account for the use of these whiskers. They indicate to him, through the nicest feeling, any obstacle which may present itself in his progress; they prevent him from rustling the leaves or boughs, and alarming his prey; and they thus, in conjunction with the soft springy pads of his feet, which render his steps noiseless, enable him to steal upon his unsuspecting victim, and make his fatal bound.



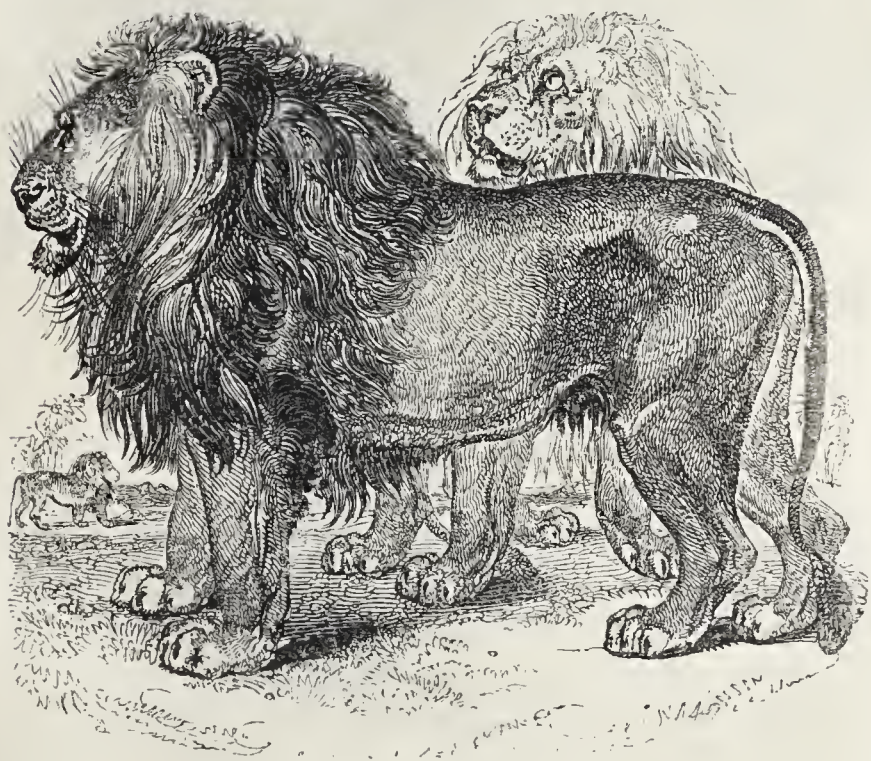
15.—African Lion. (Barbary.)

THE LION.

(*Felis Leo*, Linn.) Male, as a general rule, ornamented with a mane, of which the female is destitute.

The stern dignity of the lion, his enormous strength, his glowing eyes, his deep roar, and his destructive powers, all combine to render this terror of the desert one of the most attractive objects of a menagerie. Herodotus informs us that the camels which carried the

baggage of the army of Xerxes were attacked by them in the district of the Pæonians and Crestonæi, on their march from Acanthus to Therme (afterwards Thessalonica, now Saloniki): he adds also that these animals were numerous in the mountains between the river Nestus, in Thrace, and the Achelous, which flows through Acarnania. Aristotle gives the same locality as the abode of lions, and the same fact is repeated by Pliny, who says, "*Longè viridibus præstantiores iis quos Africa aut Libya gignunt*"—"They far exceed in strength those produced in Africa or Libya." Pausanias, alluding to the disasters which befel the baggage-camels of Xerxes, states that the lions often descended to the plain at the foot of Olympus, between Macedonia and Thessaly.



16.—Cape Lions.



17.—Bengal Lion, with Lioness.

Lions were common in Syria, as we gather from numerous passages in the Sacred records. Oppian states that Armenia and Parthia produced a formidable breed. At present the lion is confined to the interior wilds of Africa, to some of the districts of Arabia and Persia, to the country bordering the Euphrates, and to some parts of India. We hesitate not to say that throughout the whole of this range the lions are specifically identical, although different breeds may be distinguished. Of the African lions the Barbary breed is characterised by



18.—Persian Lion.

having a deep yellowish-brown fur, and the mane of the male is much developed. (Fig. 15.)

The Senegal lion has the fur of a more yellow tint, the mane is less full, and nearly wanting upon the breast and insides of the fore-legs.

The Cape lion presents two varieties, one yellowish, the other brown, the mane of the latter often deepening almost to black. The dark lion is said to be the most ferocious. (Fig. 16.)

Of the Asiatic breeds the Bengal lion has the mane

magnificently developed, the colour of the fur of a dark yellowish-brown. (Fig. 17.) It attains to a very large size. The Persian or Arabian lion is said to be characterised by the pale Isabella colour of the fur. (Fig. 18.)

Within the last few years a maneless, or nearly maneless, breed has been discovered in Guzerat. Pliny alludes to a maneless lion which he regarded as a hybrid occurring in Africa.

It is to Captain Smee that we owe our knowledge of the maneless lion. On his return from Guzerat to England he brought several skins of such lions which he



19.—Maneless Lion of Guzerat.

himself had shot; some of these he presented to the Zoological Society of London, and communicated an interesting paper to the 'Zoological Transactions' on the subject. The maneless lion of Guzerat differs from its Bengal, Persian, and African relatives, not only in the absence of a full mane, but also in being rather lower on the limbs, and in having a somewhat shorter tail, furnished at its tip with a larger brush. The colour is pale fulvous. A male killed by Captain Smee measured, including the tail, eight feet nine inches and a half; his weight, exclusive of the internal viscera, was thirty-five stone (fourteen pounds to the stone); his height three feet six inches; and the impression of his paw on the sand measured six and a half inches across. (Fig. 19.)

It is along the banks of the Sombermuttee, near Ahmedabad, according to Captain Smee, that this variety of the lion is found: it occurs also on the Rhun, near Rhunpor, and near Putton in Guzerat. "During the hot months they inhabit the low brushy-wooded plains that skirt the Bhardar and Sombermuttee rivers from Ahmedabad to the borders of Cutch, being driven out of the large adjoining tracts of high jungle called Bheers, by the practice annually resorted to by the natives of setting fire to the grass, in order to clear it and ensure a succession of young shoots for the cattle upon the first fall of the rains." So numerous are they, that Captain Smee killed in one district eleven in the course of a month. They make terrible havoc among the cattle, and when attacked exhibit great boldness. The native name for this lion is *Ontiah Baug*, or camel tiger, an appellation from the resemblance in colour to the camel.

The habits and manners of the lion have been detailed by various travellers, and no one can doubt its strength, its daring, and ferocity. Near the precincts of colonization in Southern Africa and elsewhere, where firearms are in use, it has learned by experience their fatal effects, and gained a consciousness that its powers avail but little against such weapons of destruction. If it is pursued, it turns and crouches, generally with its face to its adversary; and it is then that presence of mind and

firmness are most needed by the hunter. Mr. Burchell, in his 'Travels in South Africa,' gives an interesting account of his adventure with one of these animals :—

“The day was exceedingly pleasant, and not a cloud was to be seen. For a mile or two we travelled along the banks of the river, which in this part abounded in tall mat-rushes. The dogs seemed much to enjoy prowling about and examining every bushy place, and at last met with some object among the rushes which caused them to set up a most vehement and determined barking. We explored the spot with caution, as we suspected, from the peculiar tone of their bark, that it was what it proved to be, lions. Having encouraged the dogs to drive them out, a task which they performed with great willingness, we had a full view of an enormous black-maned lion, and a lioness. The latter was seen only for a minute, as she made her escape up the river, under concealment of the rushes; but *the lion* came steadily forward and stood still to look at us. At this moment we felt our situation not free from danger, as the animal seemed preparing to spring upon us, and we were standing on the bank at the distance of only a few yards from him, most of us being on foot and unarmed, without any visible possibility of escaping. I had given up my horse to the hunters, and was on foot myself, but there was no time for fear, and it was useless to attempt avoiding him. I stood well upon my guard, holding my pistols in my hand, with my finger upon the trigger, and those who had muskets kept themselves prepared in the same manner. But at this instant the dogs boldly flew in between us and the lion, and surrounding him, kept him at bay by their violent and resolute barking. The courage of these faithful animals was most admirable; they advanced up to the side of the huge beast, and stood making the greatest clamour in his face, without the least appearance of fear. The lion, conscious of his strength, remained unmoved at their noisy attempts, and kept his head turned towards us. At one moment, the dogs perceiving his eyes thus engaged, had advanced close to his feet, and seemed as if they would actually seize hold of him,

but they paid dearly for their imprudence, for, without discomposing the majestic and steady attitude in which he stood fixed, he merely moved his paw, and at the next instant I beheld two lying dead. In doing this, he made so little exertion that it was scarcely perceptible by what means they had been killed. Of the time which we had gained by the interference of the dogs, not a moment was lost; we fired upon him: one of the balls went through his side just between the short ribs, and the blood immediately began to flow, but the animal still remained standing in the same position. We had now no doubt that he would spring upon us; every gun was instantly re-loaded; but happily we were mistaken, and were not sorry to see him move quietly away; though I had hoped in a few minutes to have been enabled to take hold of his paw without danger.

“This was considered, by our party, to be a lion of the largest size, and seemed, as I measured him by comparison with the dogs, to be, though less bulky, as large as an ox. He was certainly as long in body, though lower in stature; and his copious mane gave him a truly formidable appearance. He was of that variety which the Hottentots and boors distinguish by the name of the *black lion*, on account of the blacker colour of the mane, and which is said to be always larger and more dangerous than the other, which they call the *pale lion* (vaal leeuw). Of the courage of a lion I have no very high opinion, but of his majestic air and movements, as exhibited by this animal, while at liberty in his native plains, I can bear testimony. Notwithstanding the pain of a wound, of which he must soon afterwards have died, he moved slowly away with a steady and measured step.

“At the time when men first adopted the lion as the emblem of courage, it would seem that they regarded great size and strength as indicating it; but they were greatly mistaken in the character they have given to this indolent, skulking animal, and have overlooked a much better example of true courage, and of other virtues also, in the bold and faithful dog.”

However meanly Mr. Burchell may think of the

courage of the African lion, there is but little doubt that in an earlier state of eolonization, and before the dread of fire-arms had become instinctive, they were far bolder than they are generally found now. One of the most remarkable examples of the audacity of a lion is to be found in the Journal of a Settler at the Cape, more than a eentury ago. The first settlement of the Dutch at Cape Town was in the year 1652: the site which they selected was on the southern edge of Table Bay, and the number of the settlers amounted only to a hundred persons. In half a century the eolonists had greatly increased, and had driven the native Hottentots a considerable distance into the interior, amongst dry and barren tracts. This is the ordinary eourse of eolonization. In 1705, the Landdrost, Jos. Sterreberg Kupt, proceeded on a journey into the country, to procure some young oxen for the Dutelh East India Company;—and he has left a very interesting Journal of his expedition, which has been translated from the original Dutelh, and published by the Rev. Dr. Philip, in his truly valuable ‘Researches in South America.’ The account which the Landdrost gives of the adventure of his company with a lion, is altogether so curious, that we extract it without abridgment:—

“ Our waggons, which were obliged to take a circuitous route, arrived at last, and we pitched our tent a musket-shot from the kraal; and after having arranged everything, went to rest, but were soon disturbed: for about midnight the cattle and horses, which were standing between the waggons, began to start and run, and one of the drivers to shout, on which every one ran out of the tent with his gun. About thirty paees from the tent stood a lion, which, on seeing us, walked very deliberately about thirty paces farther, behind a small thorn-bush, carrying something with him, which I took to be a young ox. We fired more than sixty shots at that bush, and pierced it stoutly, without perceiving any movement. The south-east wind blew strong, the sky was clear, and the moon shone very bright, so that we could perceive everything at that distance. After the cattle had been

quieted again, and I had looked over everything, I missed the sentry from before the tent, Jan Smit, from Antwerp, belonging to the Groene Kloof. We called as loudly as possible, but in vain,—nobody answered; from which I concluded that the lion had carried him off. Three or four men then advanced very cautiously to the bush, which stood right opposite the door of the tent, to see if they could discover any thing of the man, but returned helter-skelter, for the lion, who was there still, rose up, and began to roar. They found there the musket of the sentry, which was cocked, and also his cap and shoes.

“We fired again about a hundred shots at the bush, (which was sixty paces from the tent and only thirty paces from the waggons, and at which we were able to point as at a target,) without perceiving anything of the lion, from which we concluded that he was killed or had run away. This induced the marksman, Jan Stamansz, to go and see if he was there still or not, taking with him a firebrand. But as soon as he approached the bush the lion roared terribly and leapt at him; on which he threw the firebrand at him, and the other people having fired about ten shots, he retired directly to his former place behind that bush.

“The firebrand which he had thrown at the lion had fallen in the midst of the bush, and, favoured by the strong south-east wind, it began to burn with a great flame, so that we could see very clearly into and through it. We continued our firing into it; the night passed away, and the day began to break, which animated every one to aim at the lion, because he could not go from thence without exposing himself entirely, as the bush stood directly against a steep kloof. Seven men, posted on the farthest waggons, watched him to take aim at him if he should come out.

“At last, before it became quite light, he walked up the hill with the man in his mouth, when about forty shots were fired at him without hitting him, although some were very near. Every time this happened he turned round towards the tent, and came roaring towards

us; and I am of opinion that if he had been hit, he would have rushed on the people and the tent.

“When it became broad day-light, we perceived, by the blood and a piece of the clothes of the man, that the lion had taken him away and carried him with him. We also found, behind the bush, the place where the lion had been keeping the man, and it appeared impossible that no ball should have hit him, as we found in that place several balls beaten flat. We concluded that he was wounded, and not far from this. The people therefore requested permission to go in search of the man’s corpse in order to bury it, supposing that, by our continued firing, the lion would not have had time to devour much of it. I gave permission to some, on condition that they should take a good party of armed Hottentots with them, and made them promise that they would not run into danger, but keep a good look-out, and be circumspect. On this seven of them, assisted by forty-three armed Hottentots, followed the track, and found the lion about half a league farther on, lying behind a little bush. On the shout of the Hottentots, he sprang up and ran away, on which they all pursued him. At last the beast turned round, and rushed, roaring terribly, amongst the crowd. The people, fatigued and out of breath with their running, fired and missed him, on which he made directly towards them. The captain, or chief head of the kraal, here did a brave act in aid of two of the people whom the lion attacked. The gun of one of them missed fire, and the other missed his aim, on which the captain threw himself between the lion and the people so close, that the lion struck his claws into the caross (mantle) of the Hottentot. But he was too agile for him, doffed his caross, and stabbed him with an assagai. Instantly the other Hottentots hastened on, and adorned him with their assagais, so that he looked like a porcupine. Notwithstanding this he did not leave off roaring and leaping, and bit off some of the assagais, till the marksman Jan Stamansz fired a ball into his eye, which made him turn over, and he was then shot dead by the other people. He was a tremendously large beast, and had but a short

time before carried off a Hottentot from the kraal and devoured him."

In Southern Africa, within the bounds of the colony, and even sometimes beyond it, when the presence of a lion is manifested by the destruction of the domesticated animals, a "hunt" is undertaken. Of one of these hunts, Mr. Pringle, who was a settler on the eastern frontier of the Cape colony, and in 1822 was residing on his farm, or "location," at Bavian's River, has given the following vivid and most interesting narrative:—

"One night a lion, that had previously purloined a few sheep out of my kraal, came down and killed my riding horse, about a hundred yards from the door of my eabin. Knowing that the lion, when he does not carry off his prey, usually conceals himself in the vicinity, and is very apt to be dangerous by prowling about the place in search of more game, I resolved to have him destroyed or dislodged without delay. I therefore sent a messenger round the location, to invite all who were willing to assist in the enterprise, to repair to the place of rendezvous as speedily as possible. In an hour every man of the party (with the exception of two pluckless fellows who were kept at home by the women) appeared ready mounted and armed. We were also reinforced by about a dozen of the 'Bastaard' or Mulatto Hottentots, who resided at that time upon our territory as tenants or herdsmen—an active and enterprising, though rather an unsteady race of men. Our friends the Tarka boors, many of whom are excellent lion-hunters, were all too far distant to assist us—our nearest *neighbours* residing at least twenty miles from the location. We were, therefore, on account of our own inexperience, obliged to make our Hottentots the leaders of the chase.

"The first point was to track the lion to his covert. This was effected by a few of the Hottentots on foot. Commencing from the spot where the horse was killed, they followed the *spoor** through grass and gravel and brushwood, with astonishing ease and dexterity, where an inexperienced eye could discern neither footprint nor

* The Hottentot name for a footmark.

mark of any kind ; until, at length, we fairly tracked him into a large *bosch*, or straggling thicket of brushwood and evergreens, about a mile distant.

“ The next object was to drive him out of this retreat, in order to attack him in close phalanx, and with more safety and effect. The approved mode in such cases is to torment him with dogs till he abandons his covert, and stands at bay in the open plain. The whole band of hunters then march forward together, and fire deliberately, one by one. If he does not speedily fall, but grows angry and turns upon his enemies, they must then stand close in a circle, and turn their horses rear-outward ; some holding them fast by the bridles, while the others kneel to take a steady aim at the lion as he approaches, sometimes up to the very horses’ heels—couching every now and then, as if to measure the distance and strength of his enemies. This is the moment to shoot him fairly in the forehead, or some other mortal part. If they continue to wound him ineffectually till he waxes furious and desperate ; or if the horses, startled by his terrific roar, grow frantic with terror, and burst loose, the business becomes rather serious, and may end in mischief—especially if all the party are not men of courage, coolness, and experience. The frontier boors are, however, generally such excellent marksmen, and withal so cool and deliberate, that they seldom fail to shoot him dead as soon as they get within a fair distance.

“ In the present instance, we did not manage matters quite so scientifically. The Bastaards, after recounting to us all these and other sage laws of lion-hunting, were themselves the first to depart from them. Finding that the few indifferent hounds we had made little impression on the enemy, they divided themselves into two or three parties, and rode round the jungle, firing into the spot where the dogs were barking round him, but without effect. At length, after some hours spent in thus beating about the bush, the Scottish blood of some of my countrymen began to get impatient ; and three of them announced their determination to march in and beard the lion in his den, provided three of the Bastaards (who were superior

marksmen) would support them, and follow up their fire, should the enemy venture to give battle. Accordingly, in they went (in spite of the warnings of some more prudent men among us) to within fifteen or twenty paces of the spot where the animal lay concealed. He was couched among the roots of a large evergreen bush, with a small space of open ground on one side of it; and they fancied, on approaching, that they saw him distinctly, lying glaring at them from under the foliage. Charging the Bastards to stand firm and level fair should *they* miss, the Scottish champions let fly together, and struck—not the lion, as it afterwards proved, but a great block of red stone, beyond which he was actually lying. Whether any of the shot grazed him is uncertain, but, with no other warning than a furious growl, forth he bolted from the bush. The pusillanimous Bastards, in place of now pouring in their volley upon him, instantly turned, and fled helter-skelter, leaving him to do his pleasure upon the defenceless Scots—who, with empty guns, were tumbling over each other, in their hurry to escape the clutch of the rampant savage. In a twinkling he was upon them, and with one stroke of his paw dashed the nearest to the ground. The scene was terrific! There stood the lion with his foot upon his prostrate foe, looking round in conscious power and pride upon the bands of his assailants—and with a port the most noble and imposing that can be conceived. It was the most magnificent thing I ever witnessed. The danger of our friends, however, rendered it at the moment too terrible to enjoy either the grand or the ludicrous part of the picture. We expected every instant to see one or more of them torn in pieces; nor, though the rest of the party were standing within fifty paces with their guns cocked and levelled, durst we fire for their assistance. One was lying under the lion's paw, and the other serambling towards us in such a way as to intercept our aim at him. All this passed far more rapidly than I have described it. But luckily the lion, after steadily surveying us for a few seconds, seemed willing to be quits with us on fair terms; and with a fortunate forbearance, (for which he met with

but an ungrateful recompense,) turned calmly away, and driving the snarling dogs like rats from among his heels, bounded over the adjoining thicket like a cat over a footstool, clearing brakes and bushes twelve or fifteen feet high as readily as if they had been tufts of grass, and abandoning the jungle, retreated towards the mountains.

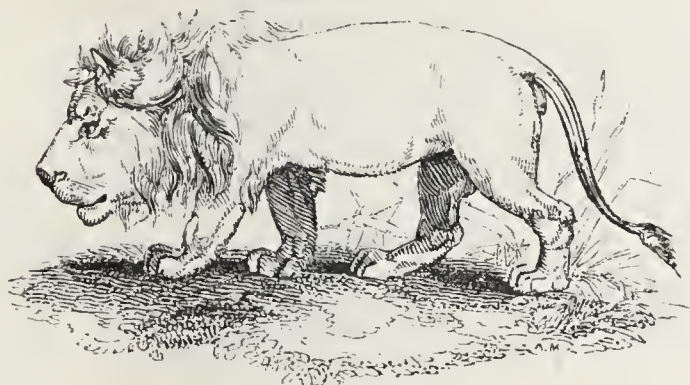
“After ascertaining the state of our rescued comrade, (who fortunately had sustained no other injury than a slight scratch on the back, and a severe bruise in the ribs, from the force with which the animal had dashed him to the ground,) we renewed the chase with Hottentots and hounds in full cry. In a short time we again came up with the enemy, and found him standing at bay under an old mimosa tree, by the side of a mountain-stream, which we had distinguished by the name of Douglas Water. The dogs were barking round, but afraid to approach him, for he was now beginning to growl fiercely, and to brandish his tail in a manner that showed he was meditating mischief. The Hottentots, by taking a circuit between him and the mountain, crossed the stream, and took a position on the top of a precipice overlooking the spot where he stood. Another party of us occupied a position on the other side of the glen; and placing the poor fellow thus between two fires, which confused his attention and prevented his retreat, we kept battering away at him, till he fell, unable again to grapple with us, pierced with many wounds.

“He proved to be a full-grown lion of the yellow variety, about five or six years of age. He measured nearly twelve feet from the nose to the tip of the tail. His foreleg below the knee was so thick that I could not span it with both hands; and his neck, breast, and limbs appeared, when the skin was taken off, a complete congeries of sinews.”

The king of the forest is a term misapplied to this noble beast; forests are not his haunts, but burning desert plains and wide karroos covered only with shrubby vegetation or interspersed with tracts of low brushwood. In India it frequents the jungles and the luxuriant borders of rivers, among which it makes its lair.

During the day the lion usually slumbers in his retreat : as night sets in, he rouses from his lair and begins his prowling. The nocturnal tempests of rain and lightning, which in Southern Africa are of common occurrence, are to him seasons of joy : his voice mingles with the roar of the thunder, and adds to the confusion and terror of the timid beasts upon which he preys, and upon which he now advances with less caution and a bolder step. In general, however, he waits in ambush or creeps insidiously towards his victim, which with a bound and a roar he dashes to the earth.

Of the strength of the lion we have most extraordinary examples on record. To carry off a man—and



20.—Crippled Lion.

this has but too often happened—is a feat of no difficulty to this powerful brute. Indeed when we find that a Cape lion seized a heifer in his mouth, and though the legs dragged upon the ground, carried her off with apparently the same ease as a cat does a rat, leaping a broad dyke with her without the least difficulty—that another, and a young one too, conveyed a horse about a mile from the spot where he had killed it—that a third, which had carried off a two-year-old heifer, was followed on the track for five hours by horsemen, who observed that throughout the whole distance the carcass of the heifer had only once or twice touched the ground,—we

may conceive that a man would be an insignificant burden. Such a powerful animal, however, we must not expect to see in the confined dens of a menagerie : there their limbs become cramped, their muscular system undeveloped, their bones often distorted, and their daring and ferocity subdued. Such a shadow of a lion Figure 20 exhibits, taken from an individual three years old, which had been pent up in a wretched cage.

The Indian lion displays the same courage as its African relative. Instead of retreating on the hunters' approach, he stands his ground, or rushes to meet them open-mouthed on the plain. Lions are thus easily shot ; but if they be missed or only slightly wounded, they prove very formidable. They will spring on the heads of the largest elephants, and have, it is asserted, often pulled them to the earth, riders and all.

In the defence of her cubs the lioness is resolute in the extreme, and is doubly savage during the time they remain under her care. Her mate participates in her feelings. The lioness goes with young five months, and generally produces from two to four young at a birth. They are born blind. For several months their fur is obscurely striped, or brindled, the markings reminding us of those of the tiger : these stripes branch off from a blackish line running down the middle of the back. Their voice is a cat-like mew. Gradually the uniform colour is assumed, and at about the end of twelve months the mane begins to appear : this increases, and the voice deepens into a roar.

The lion attains to maturity about the fifth year : its term of life is of considerable extent. Pompey, which died in the Tower in 1760, had been there for seventy years, and one from the Gambia died there at the age of sixty-three.

It has long been a popular belief that the lion lashes himself with his tail to stimulate himself into a rage ; and though such a use for it is out of the question, a sort of claw or prickle has been detected at the termination of that organ. Mr Bennett detected it in the tip of the tail of a young Barbary lion. Blumenbach had

previously ascertained the fact of its existence in a specimen examined by himself in 1829. M. Deshayes announced the existence of this prickle in a lion and lioness which died in Paris menagerie. Mr. Woods detected it only once out of numerous lions which he purposely examined; he also found a similar prickle on the tip of the tail of an Asiatic leopard.

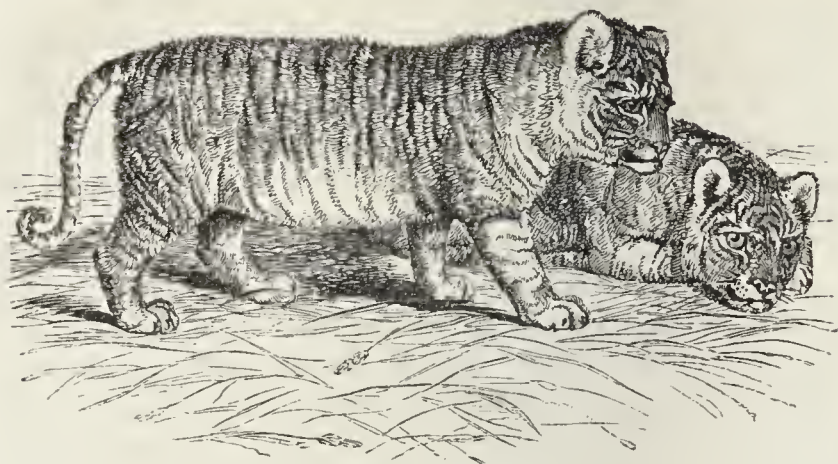
This prickle is in fact only occasionally present; it is not connected with the caudal vertebræ, but, as Mr. Woods states, appears to be inserted into the skin like the bulb of a bristle; but M. Deshayes asserts that it is of a conical shape, and adheres to the skin by its base; as does also Blumenbach. (Fig. 21.) We are much inclined to think it nothing more than an indurated and partially detached cuticle; certainly it falls off with the slightest touch.



Fig. 21.

Hybrids between the lion and tigress (Fig. 22) have occurred in our country. One litter was produced about 1824 in Atkins' menagerie, and another litter subsequently from similar parents was produced at Windsor. Of the first litter, one lived till 1842; all the others died before arriving at maturity. Their colour was brighter than that of true lion-cubs, and the bands more defined and darker.

Excepting in the vast wilds of Central Africa, untrodden by the foot of the white man, the lion, even in the regions to which it is at present restricted, is much



22.—Lion-Tiger Cubs.

more rare than formerly. The ancient Romans procured incredible multitudes for the arena: Sylla brought a hundred males at once into the combat; Pompey gave six hundred, of which more than half were males; Cæsar four hundred; nor was it until the time of the later emperors that any difficulty in procuring them began to be experienced.

There are few travellers in Africa who have not been under the necessity of encountering this formidable beast. And many are the exciting narratives which have been related, of the incidents of the chase—of escape from almost certain death—of triumph over the foe.

The bushmen of Southern Africa, according to Dr. Philip, are in the habit of insidiously attacking the slumbering lion with their poisoned arrows. They have remarked that he generally kills and devours his prey in the morning at sunrise or in the evening at sunset; that he sleeps during the heat of the day so profoundly as with difficulty to be awakened; and that when roused, he seems to lose all presence of mind. Marking the spot where a lion is supposed to have taken up his quarters for sleep, they cautiously advance, and

silently lodge a poisoned arrow in his breast. The lion, thus struck, springs from his lair and bounds off; but the work is done, and the bushmen follow his track, knowing that in a few hours, or less, he will expire.

THE TIGER.

Tigre Royal, Buffon's *Nat. Hist.*; *Felis Tigris*, Linn.



23.—Royal Tiger.

The Royal Tiger (Fig. 23), as it is often called to distinguish it from the smaller tiger-cats, is far more limited in its range than the lion. It is exclusively Asiatic. Hindustan may be considered as its headquarters, but it is common in the larger islands, as Sumatra, where it is a fearful scourge. It is said to occur in the south of China, and also in the deserts which separate China from Siberia, and as far as the banks of the Oby. It is found in Tonquin and Siam.

The ancients regarded India and Hyrcania as nurseries of the tiger. Hyrcania was a province of the ancient Persian empire, at the south-eastern corner of the Caspian Sea; but its boundaries are not very determinate. Whether the tiger still inhabits this district is not very clear; there is no reason, however, to doubt the concurrent testimonies of the ancient writers.

The tiger is equal in size to the lion, but of a more elongated form, and pre-eminently graceful. The head also is shorter and more rounded. Occasionally individuals occur exceeding any lion we have contemplated in menageries; but the average height is from three feet six inches to four feet. The general tint of the fur is of a fine yellow or reddish-yellow, ornamented by a series of transverse black bands or stripes, which occupy the sides of the head, neck, and body, and are continued on the tail in the form of rings: the under parts of the body and inner parts of the limbs are almost white. Individuals are sometimes exhibited of a very pale colour, with the stripes very obscure, and Du Halde says that the Chinese tiger (Lou-chu or Lau-hu) varies in colour, some being white, striped with black and gray.

The ancients make frequent mention of the tiger, with which it cannot be doubted that Aristotle was well acquainted, though he talks of a breed in India between this animal and the dog, meaning perhaps the cheetah, which is used for the chase. Pliny describes the "tremendous velocity" of the tiger, and the devoted attachment of the tigress to her young. Oppian speaks of swift tigers, the offspring of the zephyr; and of its swiftness Mr. Bell the traveller, and Père Gerbillon, were witnesses in China, the chase of this animal being a favourite diversion with the great Cam-Hi, the Chinese monarch. It appears that Augustus was the first who exhibited a tiger at Rome, which was tame and kept in a cage. Claudius afterwards exhibited four, and Cuvier suggests that it was in commemoration of this rare spectacle that the mosaic, discovered some years since at Rome, was made, representing four royal tigers in

the act of devouring their prey. As, however, India and its products became better known to the Romans, the tiger became more familiar to them, but was never exhibited in great numbers. Ten were in the possession of Gordian III.

Active, powerful, and ferocious, the tiger is more to be dreaded than the lion, because it is more insidious in its attack, and also prowls abroad by day as well as by night. In some districts of India and in Sumatra its ravages are frightful. We are informed by Col. Sykes that in the province of Kandeish alone one thousand and thirty-two tigers were killed from the year 1825 to 1829 inclusive, according to the official returns. In Sumatra the infatuated natives seldom attempt their destruction, having a notion that they are animated by the souls of their ancestors. Tiger-hunting is one of the favourite field-sports of the East, and as the chase is not unattended with danger it is productive of proportionate excitement. Though horsemen as well as persons on foot attend on these occasions, it is more for the sake of "being in at the death" than of taking a decided part, for the horse will seldom stand steadily when near this dreaded beast. It is to the armed riders on elephants that the dangerous work of rousing up the tiger from the jungle covert is left, and of firing at him as he bounds along. The tiger's first object is to escape under the covert of the long grass or jungle; but, when wounded or hard pressed, he will turn with great fury, and by springing on the elephant's head or shoulder endeavour to reach his antagonists. The agitation of the elephants, which often lose all obedience to control at such a moment, together with the rapidity of the attack, renders this a critical juncture, and fatal accidents have often embittered the conclusion of the contest.

Bishop Heber, in his 'Journal,' has given a lively narrative of the mode in which a tiger-hunt is conducted:—"At Kulleanpoor, the young Raja, Gourman Singh, mentioned, in the course of conversation, that there was a tiger in an adjoining tope, which had done a good deal of mischief; that he should have gone after it himself,

had he not been ill, and had he not thought it would be a fine diversion for Mr. Boulderson, the collector of the district, and me. I told him I was no sportsman; but Mr. Boulderson's eyes sparkled at the name of tiger, and he expressed great anxiety to beat up his quarters in the afternoon. Under such circumstances, I did not like to deprive him of his sport, as he would not leave me by myself, and went, though with no intention of being more than a spectator. Mr. Boulderson, however, advised me to load my pistols for the sake of defence, and lent me a very fine double-barrelled gun for the same purpose. We set out a little after three on our elephants, with a servant behind each howdah, carrying a large chatta, which, however, was almost needless. The Raja, in spite of his fever, made his appearance too, saying that he could not bear to be left behind. A number of people, on foot and horseback, attended from our own camp and the neighbouring villages, and the same sort of interest and delight was evidently excited which might be produced in England by a great coursing party. The Raja was on a little female elephant, hardly bigger than the Durham ox, and almost as shaggy as a poodle. She was a native of the neighbouring wood, where they are generally, though not always, of a smaller size than those of Bengal and Chittagong. He sat in a low howdah,* with two or three guns ranged beside him, ready for action. Mr. Boulderson had also a formidable apparatus of muskets and fowling-pieces, projecting over his mohout's head. We rode about two miles across a plain covered with long jungly grass, which very much put me in mind of the country near the Cuban. Quails and wild-fowl arose in great numbers, and beautiful antelopes were seen scudding away in all directions."

The Bishop then describes the beating of the jungle, the rushing out of two curious animals of the elk kind, called the "mohr," and the growing anxiety of all the people engaged in the hunt. He then proceeds thus:—

* The howdah is a seat somewhat resembling the body of a gig, and is fastened by girths to the back of the elephant.

“At last the elephants all drew up their trunks into the air, began to roar, and stamp violently with their fore-feet. The Raja’s little elephant turned short round, and in spite of all her mohout (her driver) could say or do, took up her post, to the Raja’s great annoyance, close in the rear of Mr. Boulderson. The other three (for one of my baggage elephants had come out too, the mohout, though unarmed, not earing to miss the show) went on slowly, but boldly, with their trunks raised, their ears expanded, and their sagacious little eyes bent intently forward. ‘We are close upon him,’ said Mr. Boulderson; ‘fire where you see the long grass shake, if he rises before you.’ Just at that moment my elephant stamped again violently. ‘There, there,’ cried the mohout, ‘I saw his head.’ A short roar, or rather loud growl, followed, and I saw immediately before my elephant’s head the motion of some large animal stealing through the grass. I fired as directed, and a moment after, seeing the motion still more plainly, fired the second barrel. Another short growl followed; the motion was immediately quickened, and was soon lost in the more distant jungle. Mr. Boulderson said, ‘I should not wonder if you hit him that last time; at any rate, we shall drive him out of the cover, and then I will take care of him.’ In fact at that moment the crowd of horse and foot spectators at the jungle side began to run off in all directions. We went on to the place, but found it was a false alarm; and, in fact, we had seen all we were to see of him, and went twice more through the jungle in vain.

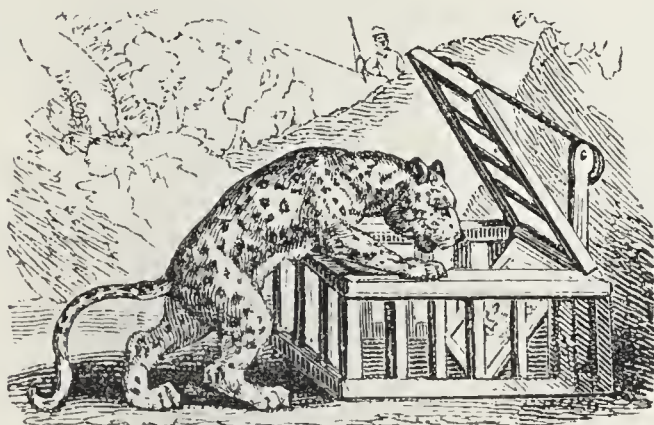
“I asked Mr. Boulderson, on our return, whether tiger-hunting was generally of this kind, which I could not help comparing to that chase of bubbles which enables us in England to pursue an otter. In a jungle, he answered, it must always be pretty much the same, inasmuch as, except under very peculiar circumstances, or when a tiger felt himself severely wounded, and was roused to revenge by despair, his aim was to remain concealed, and to make of as quietly as possible. It was after he had broken cover, or when he found himself in a situation so as to be fairly at bay, that the serious part of the

sport began, in which case he attacked his enemies boldly, and always died fighting. He added, that the lion, though not so large or swift an animal as the tiger, was generally stronger and more courageous. Those which have been killed in India, instead of running away when pursued through a jungle, seldom seem to think its cover necessary at all. When they see their enemies approaching, they spring out to meet them, open-mouthed, in the plain, like the boldest of all animals, a mastiff dog. They are thus generally shot with very little trouble; but if they are missed, or only slightly wounded, they are truly formidable enemies. Though not swift, they leap with vast strength and violence; and their large heads, immense paws, and the great weight of their body forwards, often enable them to spring on the head of the largest elephants, and fairly pull them down to the ground, riders and all. When a tiger springs on an elephant, the latter is generally able to shake him off under his feet, and then woe be to him. The elephant either kneels on him and crushes him at once, or gives him a kick which breaks half his ribs, and sends him flying perhaps twenty paces. The elephants, however, are often dreadfully torn; and a large old tiger sometimes clings too fast to be thus dealt with. In this case it often happens that the elephant himself falls, from pain, or from the hope of rolling on his enemy; and the people on his back are in very considerable danger, both from friends and foes, for Mr. Boulderson said the scratch of a tiger was sometimes venomous, as that of a cat is said to be. But this did not often happen; and in general, persons wounded by his teeth or claws, if not killed outright, recovered easily enough."

Instances are on record in which men have been carried off by tigers while travelling in company with others. The fate of Sir Hector Monro's son, who was carried off out of the midst of a party refreshing themselves on the edge of a jungle, December, 1792, in Saugur Island, is known to all. Similar instances are related.

Tigers are destroyed by various devices—pitfalls,

traps, the spear, and gun. The plan of the box-trap and looking-glass for taking tigers, leopards, &c., a device to be found in ancient sculpture, according to Montfauçon, is said to be practised by the Chinese at the present day. Fig. 24 refers to this kind of trap.



24.—Leopard-catching.

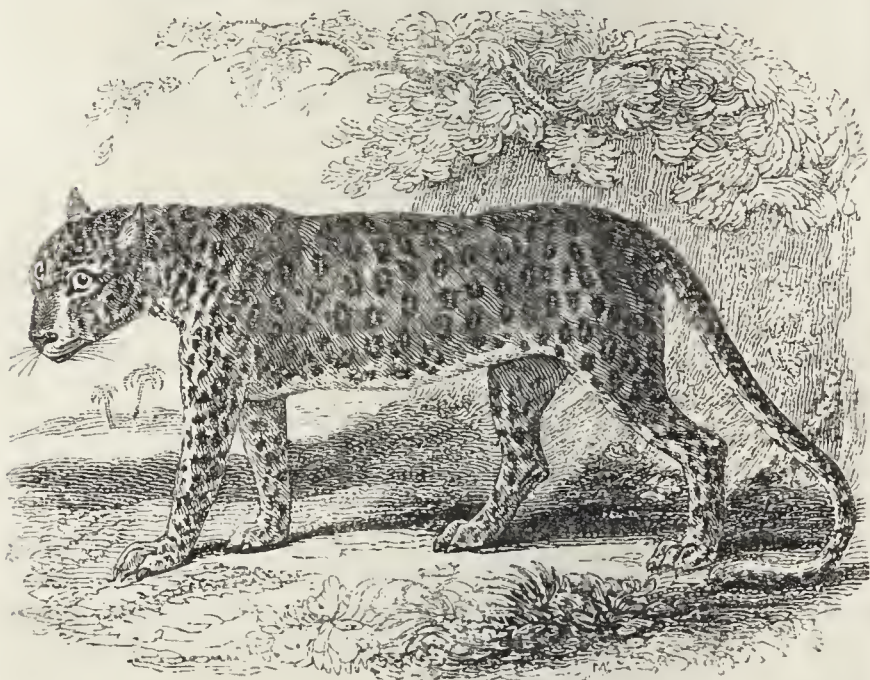
Those who have represented the tiger as untameable have no ground for the assertion. It is as capable of being tamed, and of attachment to its keeper, as any other animal of its kind. Yet with the tiger, the lion, and others of the race, caution should be used. Their natural disposition is ever ready to break out, and the mildest will, however tame they be, often show “the wild trick of their ancestors.”

Neither the tiger nor the lion is capable of climbing trees, as are most of the lighter of the feline race: their prey is therefore exclusively confined to antelopes, deer, oxen, horses, and the like; while monkeys, and even birds, are among the prey of the leopard, the panther, and the smaller *Felidæ*.

THE LEOPARD, PANTHER, AND OUNCE.

The leopard (*Felis Leopardus*), the panther (*Felis Pardus*), and the ounce of Buffon (*Felis Uncia*), have been by many naturalists confounded together, and even with the jaguar of the American continent. With re-

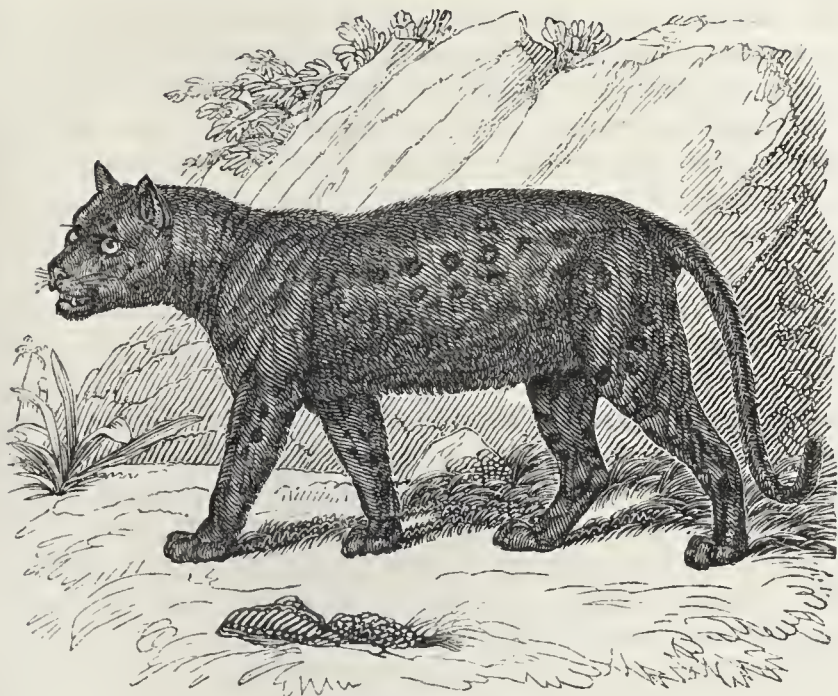
spect to the leopard and panther there are great difficulties in coming to a determination whether they are distinct species or not. In both we observe rosettes, or spots arranged in rose-form, on a fine yellow ground ; but in the size and minor arrangement of these rosettes there is the greatest variation. Major H. Smith defines the leopard as differing from the panther in being of a paler yellowish colour, of rather smaller size, and with the dots rose-formed, consisting of several dots partially united into a circular figure in some instances, and into a quadrangular, triangular, or other less determinate form, in others ; having also isolated black spots, especially about the outside of the limbs. (Fig. 25.)



25.—Leopard.

In the panther the open spots have the central space darker than the general colour of the sides. The subject is still open for investigation.

Both these beautiful creatures are widely spread in the Old World, being natives of Africa, India, and the Indian Islands, as Ceylon, Sumatra, &c. &c. In Java a



26.—Black Panther.

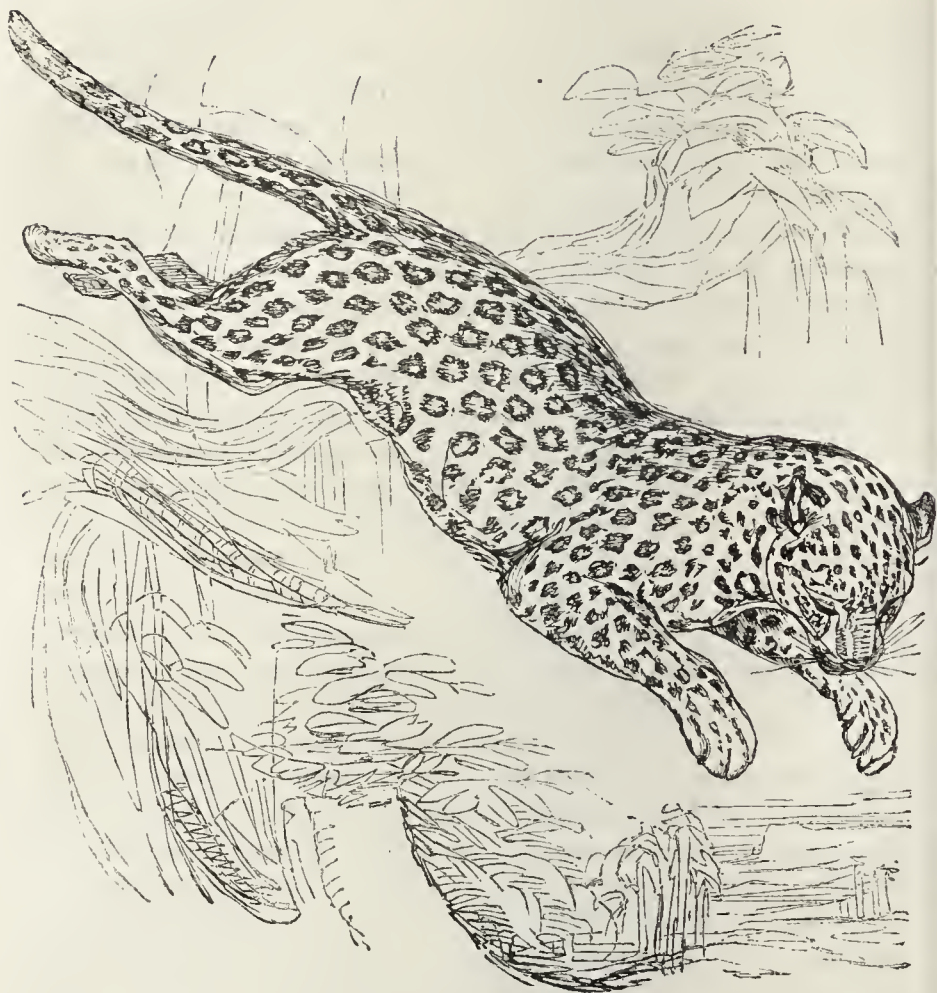
black variety (*Felis melas*) is not uncommon, and such are occasionally seen in our menageries; they are deeper than the general tint, and show in certain lights only. (Fig. 26.) A black cub, it is said, occasionally occurs in the same nest with others of the ordinary colours.

Nothing can exceed the grace and activity of these animals: they bound with astonishing ease, climb trees, and swim, and the flexibility of the body enables them to creep along the ground with the cautious silence of a snake on their unsuspecting prey. In India the leopard is called by the natives the Tree Tiger, from its generally taking refuge when pursued in a tree, and also from being often seen among the branches: so quick and active is the animal in this situation, that it is not easy to take a fair aim at him.

Antelopes, deer, small quadrupeds, and monkeys are its prey. It seldom attacks a man voluntarily, but if provoked becomes a formidable assailant. Like the other Felidæ, the habits of the leopard are compounded

of ferocity and cunning. A gentleman in the civil service at Ceylon has given the following description of an encounter with a leopard or panther, which throughout India are commonly called tigers :—" I was at Jaffna, at the northern extremity of the island of Ceylon, in the beginning of the year 1819; when, one morning, my servant called me an hour or two before my usual time, with ' Master, master! people sent for master's dogs—tiger in the town!' Now, my dogs chanced to be some very degenerate specimens of a fine species, called the Poligar dog, which I should designate as a sort of wiry-haired greyhound, without scent. I kept them to hunt jackals; but tigers are very different things: by the way, there are no real tigers in Ceylon; but leopards and panthers are always called so, and by ourselves as well as by the natives. This turned out to be a panther. My gun chanced not to be put together; and while my servant was doing it, the collector, and two medical men, who had recently arrived, in consequence of the cholera morbus having just then reached Ceylon from the continent, came to my door, the former armed with a fowling-piece, and the two latter with remarkably blunt hog-spears. They insisted upon setting off without waiting for my gun, a proceeding not much to my taste. The tiger (I must continue to call him so) had taken refuge in a hut, the roof of which, as those of Ceylon huts in general, spread to the ground like an umbrella; the only aperture into it was a small door, about four feet high. The collector wanted to get the tiger out at once. I begged to wait for my gun; but no—the fowling-piece (loaded with ball, of course) and the two hog-spears were quite enough. I got a hedge-stake, and awaited my fate, from very shame. At this moment, to my great delight, there arrived from the fort an English officer, two artillery-men, and a Malay captain; and a pretty figure we should have cut without them, as the event will show. I was now quite ready to attack, and my gun came a minute afterwards. The whole scene which follows took place within an enclosure, about twenty feet square, formed, on three sides, by a strong

fence of palmyra leaves, and on the fourth by the hut. At the door of this the two artillery-men planted themselves; and the Malay captain got at the top, to frighten the tiger out, by unroofing it—an easy operation, as the huts there are covered with cocoa-nut leaves. One of the artillery-men wanted to go in to the tiger, but we would not suffer it. At last the beast sprang; this man received him on his bayonet, which he thrust apparently down his throat, firing his piece at the same moment. The bayonet broke off short, leaving less than three inches on the musket; the rest remained in the animal, but was invisible to us: the shot probably went through his cheek, for it certainly did not seriously injure him, as he instantly rose upon his legs, with a loud roar, and placed his paws upon the soldier's breast. At this moment, the animal appeared to me to about reach the centre of the man's face; but I had scarcely time to observe this, when the tiger, stooping his head, seized the soldier's arm in his mouth, turned him half round, staggering, threw him over on his back, and fell upon him. Our dread now was, that if we fired upon the tiger, we might kill the man: for a moment there was a pause, when his comrade attacked the beast exactly in the same manner as the gallant fellow himself had done. He struck his bayonet into his head; the tiger rose at him—he fired; and this time the ball took effect, and in the head. The animal staggered backwards, and we all poured in our fire. He still kicked and writhed; when the gentlemen with the hog-spears advanced, and fixed him, while some natives finished him, by beating him on the head with hedge-stakes. The brave artillery-man was, after all, but slightly hurt: he claimed the skin, which was very cheerfully given to him. There was, however, a cry among the natives that the head should be cut off: it was, and in so doing, the knife came directly across the bayonet. The animal measured scarcely less than four feet from the root of the tail to the muzzle. There was no tradition of a tiger having been in Jaffna before; indeed, this one must have either come a distance of almost twenty miles, or have swum across



27.—Leopard. (Senegal.)

an arm of the sea nearly two in breadth; for Jaffna stands on a peninsula on which there is no jungle of any magnitude.”

The leopard is taken in pitfalls and traps. In some old writers there are accounts of the leopard being taken in a trap by means of a mirror, which, when the animal jumps against it, brings the door down upon him. (Fig. 24.) This story may have received some sanction from the disposition of the domestic cat, when young, to survey her figure in a looking-glass.

The leopard and panther are easily tamed, and become

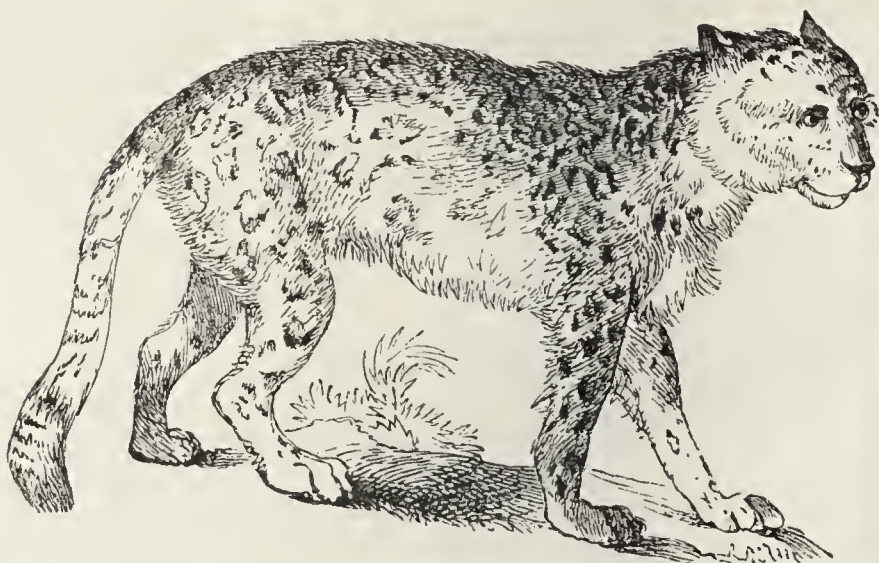
gentle and affectionate, purring when pleased, and rubbing their sides against the bars of their cage, or against their keeper, like a cat. When at play they bound around their enclosure with the agility of a squirrel, and so quick that the eye can scarcely follow their movements. From such an exhibition we may easily form some idea of their agile movements in a state of nature. (Fig. 27.)

In Loudon's 'Magazine of Natural History' is an account, by Mrs. Bowdich, of a tame leopard which she had in her possession. She won the affections of the creature by presenting him with lavender-water on a tray-card. The animal revelled in the delicious essence almost to extasy. We know the fondness of the common cat for mint, valerian, and other aromatic herbs, on which they delight to roll. The leopard stands about two feet in height: its figure is slim and graceful, but vigorous, and its proportions admirable.

The ounce (*Once*, Buffon), *Felis Uncia*. Whatever may be the specific distinction between the leopard and panther, no one can hesitate as to the ounce, figured by Buffon, and after him by Bewick ('Quadrupeds').* Till recently, however, it was confounded with one or both of the above animals, but it is most decidedly a different species. Our figure (28) is taken from a specimen in the British Museum, which in 1837 Mr Gray brought before the notice of a scientific meeting of the Zoological Society of London. It formed part of a collection made by the late Colonel Cobb in India. The fur is full and long, indicating most probably a mountain residence rather than the sultry plains. The general colour is gray or whitish-gray, tinged with yellow, lighter on the breast and under parts. The head is marked on the top with black spots, a large one being behind the ears. The body and sides of the limbs are variegated with irregular wavy marks, forming rounded or rather oval figures, but not definitely nor so orderly arranged as

* The concluding part of Bewick's details refers to the cheetah, which he elsewhere notices, but not by its name.

in the leopard. The tail, which is very long, is almost bushy, especially at its termination, the hair being very full. An individual of this species was seen by Colonel H. Smith in the Tower, before the menagerie contained within its precincts was dispersed. It was said to have been brought from the Gulf of Persia.



28.—Ounce.

THE RIMAU-DAHAN. (*Felis macrocelis*, Temm.)

This beautiful species is a native of Sumatra, where it was discovered by the late Sir Stamford Raffles, who brought a young specimen alive to England, where it died soon after its arrival. (Fig. 29.) A larger and older individual was lost in the Fame. Respecting these individuals, Sir S. Raffles remarks that they were, while in confinement, remarkable for good-temper and playfulness; no domestic kitten could be more so: they courted the notice of persons, throwing themselves on their backs, and delighting to be fondled.

With a small dog that was on board, the rimau-dahan used to play and gambol, at the same time acting with great gentleness. He never seemed to look on men or



29.—Rimau-Dahan.

children as prey, but as companions, and the natives assert that when wild they live principally on poultry, birds, and the smaller kinds of deer. They are not found in numbers, and may be considered as rather rare even in Sumatra: they are found in the interior of Bencoolen, on the banks of the Bencoolen river, and frequent the vicinity of villages, not being dreaded, except for their propensity to destroy poultry. The natives assert that they sleep and often lie in wait for their prey in trees, and from this circumstance they derive the name of dahan, which signifies the fork formed by the branch of a tree, across which

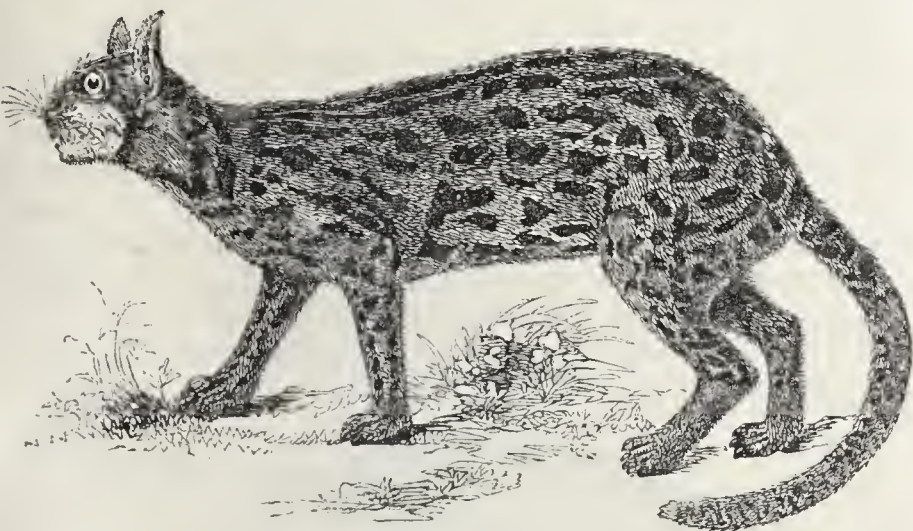
they are said to rest and occasionally stretch themselves. The rimau-dahan is, when adult, larger than the leopard, and is remarkable for the thickness and strength of its limbs and paws, but the contour of its body is very graceful. The head is small, and the physiognomy less expressive of ferocity than that of the tiger or leopard. The tail is extremely long and thickly covered with fine full fur, as indeed is the body also. The general ground-colour is brownish-gray, on which are dispersed streaks and marbled markings of black of an irregular form, and more or less angular. Two longitudinal bands pass along the spine; a band stretches from each ear down the side of the neck, and two obliquely traverse each side of the face. The large marbled markings have an abrupt edge behind, and the black has the appearance of velvet.

An allied but much smaller species, from the Indian Islands, will be found described in the 'Proceedings of the Zoological Society of London' for 1836, p. 107, under the title of *Felis Marmorata*.

THE NEPAUL TIGER-CAT. (*Felis Nepalensis*.)

This is a slender species, measuring about one foot ten inches in the length of the head and body, that of the tail being ten and a half inches. (Fig. 30.) Its distinguishing characters are its lengthened contour and the slenderness and proportional length of the tail. The ground is tawny-gray, passing into white on the throat and under parts; longitudinal marks of a deep black run down the back, and broad irregular dashes of the same colour ornament the sides, flanks, and outer surface of the limbs; the under parts are marked with oval spots, the thighs externally with rounded spots; the tail above, excepting at the extremity, spotted; the cheeks streaked with two black lines, and a transverse lunar mark passes round the angle of the mouth, while a narrow band is continued across the throat. An individual of this species was formerly living in the gardens of the Zoological Society, London. It was extremely savage and wild:

it generally sat up like a domestic cat, and never paced its den, as do most of the feline animals. It is stated to have come originally from Nepaul, whence it was sent to Calcutta, and thence brought to England.



30.—Nepaul Tiger-cat.

THE SERVAL. (*Felis Serval.*)

The serval is a native of southern Africa, and is not uncommon in menageries; specimens are living in the gardens of the Zoological Society of London. (Fig. 31.) It is frequently very tame and playful, gambolling like a kitten, and enduring captivity without sullenness or a display of ferocity. The disposition of the feline race greatly depends on the treatment they experience, so that, while some are savage and distrustful, others of the same species are familiar. Some species, however, are more easily reclaimed than others, and of these we may count the serval.

The serval stands about eighteen inches in height at the shoulders: the length of the head and body is thirty-four inches, that of the tail ten inches.

The upper parts are of a clear yellowish-white with black spots: the lower parts are white, spotted more

distantly with black. Symmetrical lines adorn the head and neck, directed towards the shoulders. The back of the ears is black at the base, then barred transversely with white, and tipped with yellow: on the inside of the fore-limbs are two black bars. Tail ringed with black.

The general form is slender, and the limbs are thin; the head is long, compressed, and viverrine in its character; the ears are large and broad, and their bases nearly meet each other on the top of the head, giving a singular expression to the physiognomy. In some specimens the markings are more decided than in others. Our measurements are taken from one of five specimens in the Museum at Paris.



31.—Serval.

THE CHEETAH. (*Felis jubata*.)

This elegant animal, the cheetah, or hunting leopard, is spread extensively throughout Africa and India. Mr. Bennett observes that “Chardin, Bernier, Tavernier,

and others of the older travellers, had related that in several parts of Asia it was customary to make use of a large spotted cat in the pursuit of game, and that this animal was called Youze in Persia, and Cheetah in India ; but the statements of these writers were so imperfect, and the descriptions given by them so incomplete, that it was next to impossible to recognise the particular species intended. We now, however, know with certainty that the animal thus employed is the *Felis jubata* of naturalists, which inhabits the greater part both of Asia and Africa. It is common in India and Sumatra, as well as in Persia, and is well known both in Senegal and at the Cape of Good Hope ; but the ingenuity of the savage natives of the latter countries has not, so far as we know, been exerted in rendering its services available in the chase in the manner so successfully practised by the more refined and civilised inhabitants of Persia and Hindostan."

The cheetah differs in one or two points from the more typical of its race. The Felidæ in general possess a broad rounded paw, armed with sharp-hooked and completely retractile claws, which are protruded at pleasure ; but in the cheetah the foot is long and narrow, and more like that of a dog, while the claws, from the laxity of the spring-ligaments, are very partially retracted, and are consequently worn and blunted at the points. As large in the body as the leopard, the cheetah is superior to that animal in height, and differs from it also in general figure. In the first place, the limbs, unadapted for climbing, are long, slender, and tapering ; and the body, which is deficient in breadth, reminds one in some degree of that of the greyhound. (Fig. 32.) In consequence of these differences, Wagler separated it into a distinct genus, under the title of *Cynailurus*, in allusion to its intermediate station between the canine and feline races. The African cheetah has been by some regarded as a distinct species from that of India, under the supposition that the thin mane which covers the back of the neck was characteristic only of the African animal. Under this impression, the term *jubata* (maned) was restricted to



32.—Cheetah.

the African, and the term *venatica* (hunting) given to the Indian, cheetah. This is, however, altogether erroneous. In India the wild animal has a rough coat in which the mane is marked; but domesticated animals from the same part of the country are destitute of a mane, and have a smooth coat. The general colour of the cheetah is fawn yellow, covered with round black spots; a distinct black stripe passes from the inner angle of the eye to the angle of the mouth. The tip of the nose is black. The profile of the forehead and face is convex; the eye is peculiarly large, fine, and expressive; the pupils are circular; the tail is long, and curled up at its extremity, which is white; the fur is not sleek, but rather crisp. The skin of the cheetah is an article of

some importance in trade at Senegal, but is neglected at the Cape of Good Hope: this animal, called *Luipard* by the Dutch colonists, is indeed rare in that district, but the skin is occasionally seen worn by Kaffir chiefs, by way of distinction. In Africa the rude natives never dream of employing the cheetah as a means of procuring food,—they know not its value in the chase. In Persia and India it has, however, been employed from an early period. In the 'Field-Sports of India,' the mode of coursing with the cheetah is thus described:—"They (the cheetahs) are led out in chains, with blinds over their eyes, and sometimes carried out in carts; and when antelopes or deer, are seen on a plain, should any of them be separated from the rest, the cheetah's head is brought to face it, the blinds are removed, and the chain is taken off. He immediately crouches (Fig. 32*), and creeps along with his belly almost touching the ground, until he gets within a short distance of the deer, who, although seeing him approach, appears so fascinated, that he seldom attempts to run away. The cheetah then makes a few surprising springs, and seizes the deer by the neck. If many deer are near each other, they often escape by flight; their number, perhaps, giving them confidence."

We may add to this, that the cheetah takes advantage of every means of making its attack, and that, when unsuccessful in its effort, it returns sullenly to its keeper, who replaces the hood, and reserves him for another opportunity. When, however, he has grappled with the quarry and fixed himself upon its throat, drinking the life-blood warm, his nature breaks out in all its violence, so that it requires some management to separate him from his victim. Partly awed by the keeper's voice, partly enticed by pieces of meat, and a ladleful of the blood, he is induced to relinquish the prize, and submit to be again hooded. In all this we are reminded of the art of falconry.

In captivity the cheetah is familiar, gentle, and playful; and becomes greatly attached to those who feed or notice it. The general disposition of these beautiful creatures is, indeed, frank and confiding; and conse-



32*.—Cheetah.

quently there is little trouble in rendering them perfectly domestic. Their voice of pleasure is a *pur*; of uneasiness or hunger, a short reiterated *mew*.

THE WILD CAT. (*Felis Catus*.)

This cat is the Chat Sauvage of the French, Gato Montes of the Spaniards, Wilde Katze and Baumritter of the Germans, Vild Kat of the Danes, Cathgoed of the ancient Britons, and *Catus sylvestris* of Klein. This species, which yet exists in the mountainous and wooded districts of the British Islands, is spread through a great part of Europe and Asia. It is common in the forest tracts of Germany, Russia, Hungary, the north of Asia, and Nepaul. It is larger and has fuller fur, in the colder latitudes.

In Britain it was formerly very abundant, and was one of the beasts of chase, as we learn from king Richard II.'s charter to the abbot of Peterborough, giving him permission to hunt the hare, fox, and wild cat. The fur in those days does not seem to have been of much value, for it is ordained in bishop Corboyl's canons, A.D. 1127, that no abbess or nun should use more costly apparel than such as is made of lambs' or cats' skins. The wild cat is still found in the hilly parts of the north of England, and more plentifully in Scotland and some parts of Ireland.

Its general form is robust; the tail is bushy, and fuller at the termination. The general colour is gray, undulated with transverse blackish stripes; a black streak runs down the back; the tail is annulated; the soles of the feet to the heel are black; two black stripes pass from the eyes over and behind the ears. The fur is deep. Length of head and body one foot ten inches; of the tail eleven inches. (Fig. 33.) Temminck gives the total average length as three feet. Hares, leverets, rabbits, and birds are its prey. It is bold and savage, and defends its young with great obstinacy. Formerly naturalists regarded this cat as the origin of the domestic cat, but of late years this opinion has been questioned.



33.—Wild Cat.

In the first place, a cat in a domestic condition was one of the animals revered by the ancient Egyptians, and mummies of it are found in the pits of Thebes. Now this cat was not the common wild cat, but a distinct species. In the second place, the domestic cat is not noticed as being one of the domestic animals of the ancient Britons by any of the Latin writers, nor, indeed, do we hear of it in our island till the tenth century, when we find its value fixed at a high rate, and laws enacted to regulate its preservation. The Welsh statutes of Howel Dha (who died A.D. 948) are, in fact, proofs of its importance; and such laws would hardly have been laid down had not the animal been regarded in the light of a new and important acquisition. If it were indeed the offspring of the wild cat, which then abounded

in the forests of our island, the opportunities of procuring young broods would have been so abundant, that all regulations respecting it would have been superfluous; and still less would the then considerable sums of a penny as the price of a kitten before it could see, two-pence until it caught a mouse, and after that four-pence, have been established. There are, besides, other regulations, all tending to prove the high value affixed to the domestic cat at that period. In the third place, the wild cat is much larger than our domesticated cat, and this is contrary to the general rule, domesticated animals being larger than their wild relatives. It may be observed that the tail of the wild cat is rather short, full, and cylindrical; while in the domestic cat it is long and taper. We here give (Fig. 34) the tail of a

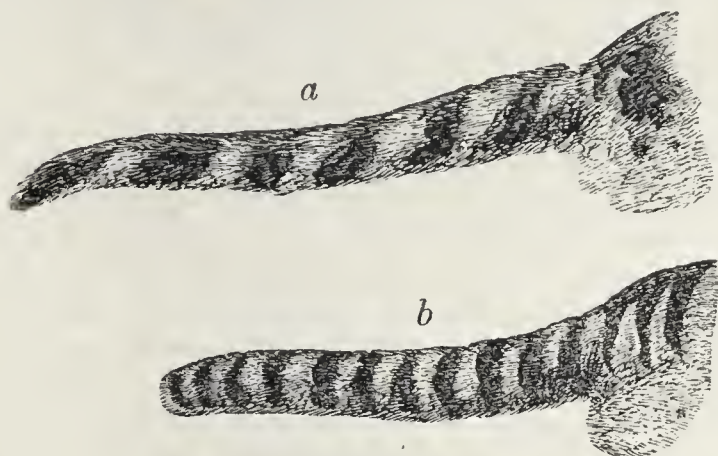


Fig. 34.

domestic cat which had betaken itself to the woods, leading an independent life (*a*); and the tail of the true wild cat (*b*). Besides, the wild cat stands higher on the limbs, and is of a more lynx-like figure. Dr. Fleming considers it probable that the domestic kind is originally from Asia, but Rüppel and Temminck consider it as decidedly the descendant of the tame Egyptian cat (*Felis maniculata*), found now wild in Upper Egypt and Nubia. It is easy to perceive how from Egypt the

domestic cat would pass into Greece and Italy, and so into the western provinces of the Roman Empire. It is most probable, then, that Temminck and Rüppel are correct ; but still, has not the domestic cat in Europe subsequently intermingled with the wild cat, and produced a mixed, though fertile breed ? We are inclined to think so. Cats of the domestic kind often assume wild habits, and live in warrens, preserves, and woods : we must distinguish between these and the true wild cat.

THE EGYPTIAN CAT. (*Felis maniculata*.)

This cat was discovered in Nubia by Rüppel, west of the Nile, near Ambukol, in a rocky district overrun with brushwood. It is of the size of a moderate domestic cat, and is probably of the same stock as that of the domestic cat which the Egyptians honoured. Rüppel considers it a descendant of that breed, but it may be, and probably is, from the wild original race, and is indigenous in Nubia. (Fig. 35.) It agrees exactly with the preserved mummies of cats which the Egyptians embalmed. The following is a detailed description of this species :—

The woolly or ground hair is in general of a dirty ochreous, darker on the back and posterior parts, and becoming gradually lighter on the anterior and lateral parts ; longer hair of a swarthy dirty white, so that the appearance of the animal is grayish-yellow. Skin of the edges of the lips and of the nose bare and black. Beard and bristles of the eyebrows shining white, brown at the roots ; edges of eyelids black ; iris glaring yellow. From the inner corner near the eye there is a dark-brown streak running in the direction of the nose, and there is a white streak as far up as the arch of the eyebrows ; between these two streaks is another grayish one extending on the forehead by the side of the ears and under the eyes. Outside of the ears gray, inside white and without tufts of hair. Eight slender black undulating lines arise on the forehead, run along the occiput, and are lost in the upper part of the neck. Cheeks, throat, and anterior part of the neck shining white. Two



35.—Egyptian Cat.

ochreous-yellow lines spring, the one from the outer corner of the eye, the other from the middle of the cheek, and meet both together under the ear, and two rings of the same colour encircle the white neck; below the rings there are spots of ochreous-yellow. Chest and belly dirty white, with similar spots or semicircular lines. A dark streak along the back becomes lighter as it rises over the shoulders, and darker on the cross. This streak is gradually lost on the upper part of the tail, the lower surface of which is white-yellow. The tail is almost of an equal thickness, rather slender, and with two dark rings at its point. The extremities, which have less hair in proportion on the outer side, are of the general colour, with besides five or six blackish semicircular bands on the fore-legs, and six distinct dark cross streaks on the hind-

legs. The inner sides are lighter in colour, with two black spots or streaks on the upper parts of the fore-legs, and the hind extremities show the cross streaks winding around the thighs towards the inside. Foot, soles, hind parts of ankles, and wrists shining black. Length two feet five inches, the tail being about nine; height at the shoulder about nine inches and a half. The description was taken from an aged female.

THE JAGUAR. (*Felis Onca.*)

The jaguar is the leopard or panther of the American forests, and in power and daring almost approaches to the tiger of the Indian jungles. We have already stated that specimens of this savage beast have been confounded with the leopard; but the jaguar, besides differing in other points, always displays a bold streak or two of black, extending across the chest from shoulder to shoulder, which is a distinctive character. The rosettes on the body are very large, open, and somewhat angular, with a central spot or two of black in each; a central chain of black dashes extends along the spine. (Fig. 36.) The jaguar, though varying in size, generally exceeds the leopard; and its form is more robust and less agile and graceful. The limbs are short, but immensely thick and muscular; the head larger and of a squarer contour, and the tail of less comparative length. Of all the American Felidæ, the jaguar is the most formidable. It prefers the marshy and wooded districts of the warmer latitudes, and haunts the vast forests along the larger rivers. It swims and climbs with equal ease, and preys on the larger domestic quadrupeds, on peccaries, capybaras, and monkeys, as well as on fish and tortoises. Sonnini saw the scratches left by the claws of the jaguar on the smooth bark of a tree some forty feet high, without branches; he traced the marks of several slips made by the climber, but the animal had at last reached the top. Humboldt heard the jaguar's yell from the tops of the trees, followed by the sharp, shrill, long whistle of the terrified monkeys, as they seemed to



36.—Jaguar.

flee. It takes birds on their nests, and fish in the shallows ; and, in some districts, the havoc it makes among horses, cattle, and sheep is terrible. So great are the numbers of these beasts in the Spanish colonies, that, according to Humboldt, four thousand were annually killed ; and two thousand skins were exported every year from Buenos Ayres only. The empty shells of turtles were pointed out to Humboldt as having been cleared of their contents by the jaguar, which watches them as they come to the sandy beaches to lay their eggs, pounces upon them, and turns them on their backs ; he then insinuates his paw between the shells, and scoops

out the contents as clean as with a knife. As he turns many more than he can devour at a meal, the Indians often profit by his dexterous eunning. The eggs of the turtle are often dug up by him out of the sand, and devoured ; and young turtles, on their road to the water, or in shallows, are also destroyed.

It is not often that the jaguar voluntarily attacks man. When hard pressed, however, he makes a resolute defence. The Indians often despatch him with their poisoned arrows, and sometimes boldly attack him with lances. On the plains the lasso is used with great effect.

There is a black variety of the jaguar, le Jaguar noir of the French, and probably the Jaguarete of Marcgrave. This seems to have been the animal noticed by Lieut. Maw, R.N. ('Journal of a Passage from the Pacific to the Atalantic : ' 1829), at Para, as a black onça. It had been procured up the rivers, and was a formidable beast, with limbs as thick as (Lieut. Maw says thicker than) those of a Bengal liger.

THE PUMA. (*Felis concolor*, Linn.)

This large feline animal is often called the American lion, chiefly, as it would appear, from its uniformity of colour, which, combined with its ferocity, led the early travellers to give it that appellation. Thus John de Laet (1633) says that lions are found in Peru, though they are few and not so ferocious as they are in Africa, and that they are called in the native tongue Puma. In 'The Perfect Description of Virginia,' (a tract, 1649,) "Lions, bears, leopards, and elks" are enumerated. Hernandez describes it (1651) as the Puma seu Leo Americanus, and contends, rightly enough, that it is not a true lion. By Piso the animal is noticed as the Cuguacuara. Marcgrave terms it the Cuguacurana of the Brazilians ; De Azara, the Gouazouara of Paraguay. Hence the French name, often used by British writers, Cougar. Charlevoix describes it under the erroneous names of Careajou and Quinceajou. The Anglo-Americans term it "panther," and under this name Lawson, Catesby, and others describe it.



37.—Puma.

In its general contour the puma is elegantly formed ; but the limbs are very thick, while the head is comparatively small, particularly in the female. The general colour is silvery-fawn above, fading into white beneath and on the inside of the limbs ; the ears on the outside, particularly at their base, the sides of the muzzle and the end of the tail, which is destitute of a tuft, black. Length from nose to root of tail, about four feet ; of the tail, upwards of two feet. The young are marked with three chains of blackish-brown streaks along the back, and the sides, shoulders, and neck have clouded spots of the same colour. As the animal advances in age, these markings fade, and ultimately disappear. (Fig. 37.)

The puma is extensively spread throughout North and South America; but it is not only more scarce than formerly, but its range is more contracted; and, as civilization advances, will be still further reduced. This beautiful animal is savage and ferocious, but easily tamed, and soon becomes very familiar. The late Mr. Edmund Kean had one in his possession, which was perfectly domesticated; and we have seen others very gentle, though playful and animated. Lawson, who, in his 'History of Carolina,' well describes the puma, is therefore in error when he states that "when taken young it is never to be reclaimed from its wild nature." This writer says, "The Panther (puma) climbs trees with the greatest agility imaginable, is very strong-limbed, catching a piece of meat from any animal he strikes at; his tail is exceedingly long; his eyes look very fierce and lively, are large, and of a grayish colour; his prey is swine's-flesh, deer, or anything he can take. He halloos like a



man in the woods when killed, which is by making him take to a tree, as the least cur will presently do; then the huntsmen shoot him; if they do not kill him outright he is a dangerous enemy when wounded, especially to the dogs that approach him. This beast is the greatest enemy to the planter of any vermin in Carolina. His flesh looks as well as any shambles meat whatsoever: a great many people eat him as choice food, but I never tasted of a panther, so cannot commend the meat by my own experience. His skin is a warm covering for the Indians in winter, though not esteemed among the choice furs. This skin dressed makes fine women's shoes or men's gloves." (Fig. 38.)

The puma is indeed a very destructive animal: not only the peccary and the capybara fall a prey to his destructive habits, but sheep, hogs, and cattle are among his victims; of the former he has been known to kill fifty in a single night. It is not often that the puma attacks man, though when wounded he becomes a dangerous foe. Sir F. Head, in his 'Journey across the Pampas,' gives the following interesting narrative, in proof of the fear of man which this animal, in common with others, entertains. The person who related it to Sir Francis was himself the actor in the scene:—

"He was trying to shoot some wild ducks, and, in order to approach them unperceived, he put the corner of his poncho (which is a sort of long narrow blanket) over his head, and, crawling along the ground upon his hands and knees, the poncho not only covered his body, but trailed along the ground behind him. As he was thus creeping by a large bush of reeds, he heard a loud sudden noise, between a bark and a roar: he felt something heavy strike his feet, and, instantly jumping up, he saw, to his astonishment, a large lion actually standing on his poncho; and, perhaps, the animal was equally astonished to find himself in the immediate presence of so athletic a man. The man told me he was unwilling to fire, as his gun was loaded with very small shot; and he therefore remained motionless, the lion standing on his poncho for many seconds: at last the creature turned

his head, and walking very slowly away about ten yards, he stopped and turned again: the man still maintained his ground; upon which the lion tacitly acknowledged his supremacy, and walked off." (Fig. 39.)

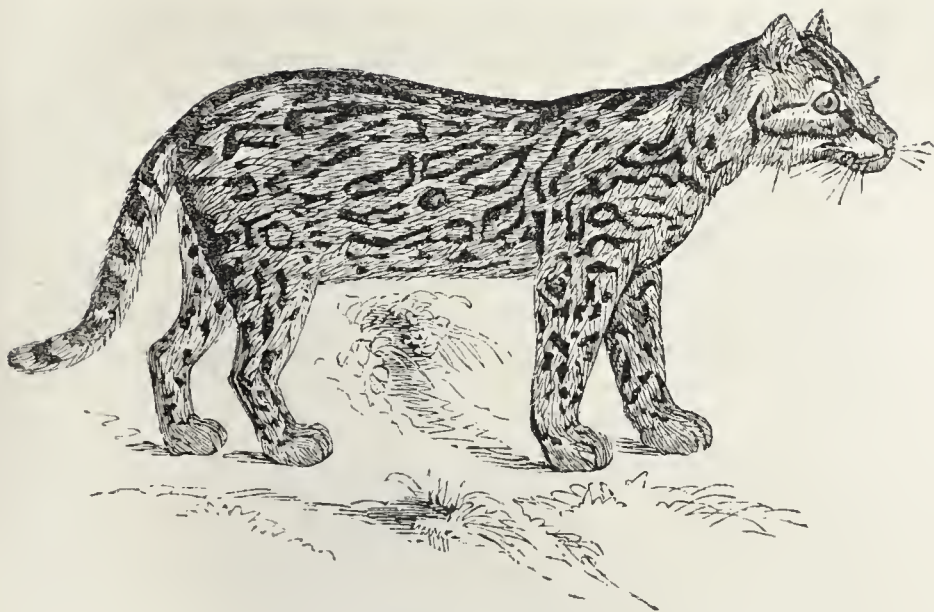


39.—Puma.

Audubon, in his 'Ornithological Biography,' gives a spirited account of the chase of the puma, or Cougar as he terms it, which was hunted by dogs, and men armed with rifles: it was driven by their united exertions from tree to tree, and perished, fighting with the dogs, having received several balls, one of which produced a mortal wound. On the Pampas the puma is hunted with dogs, and, while it is engaged in the conflict surrounded by them, the dexterous Gaucho strikes him senseless with his bolas, or throws his lasso over him, and, galloping off, drags him along the ground till almost lifeless, when the dogs rush upon him and tear him to pieces.

THE OCELOT. (*Felis pardalis*.)

This elegantly marked species of tiger-cat is a native of Mexico, Paraguay, and probably of Peru. (Fig. 40.) It measures nearly three feet in the length of the head and body, the tail is about a foot long, and the medium height is about eighteen inches. The ground-colour of the fur is gray slightly tinged with fawn; upon this are disposed longitudinal bands, of which the margins are perfectly



40.—Ocelot.

black, the central parts being of a deeper fawn than the general ground. These ribands of black, enclosing a deep fawn, become deep black lines and spots on the neck and head and on the outer aspect of the limbs. From the top of the head towards the shoulders there pass several diverging black bands, and on the top of the back the line is quite continuous. The tail is spotted upon a ground like that of the body. The term ocelot is a corruption of the Mexican names *Tlacoozelotl*, or *Tlalocelotl*, as given by Hernandez, who terms it *Catus pardus Mexicanus*.

The ocelot is often exhibited in menageries, and is generally good-tempered and playful: we have seen several which might be said to be perfectly domesticated. Bewick states that "nothing can soften the natural ferocity of its disposition, nor calm the restlessness of its motions. One of these animals, shown at Newcastle in 1788, although extremely old, exhibited great marks of ferocity. It was kept closely confined, and would not admit of being caressed by its keeper." Harsh usage and close confinement have often spoiled

the temper of animals, and the fault is always laid to their disposition, and not to mismanagement. Mr. Bennett informs us that a specimen which was kept in the Tower menagerie was extremely familiar, and had much of the character and manners of the common cat. Its food consisted principally of rabbits and birds; the latter it plucked with great dexterity, and always commenced its meal with the head, of which it seemed particularly fond; but it did not eat with the ravenous avidity which characterizes nearly all the animals of this tribe.



41.—Ocelot.

Of the manners of the ocelot in a state of nature little is known. It inhabits the deep forests and preys upon small quadrupeds and birds; climbing the trees in quest of the latter, and lying in wait for them concealed among the foliage. (Fig. 41.) It is said to take monkeys by a very subtle mode of proceeding. When it perceives a troop

of these active creatures, it immediately stretches itself out, as if dead, on the limb of some tree; urged by curiosity they hasten to examine the supposed "mortal remains" of their enemy,—the foremost pays dearly for his curiosity.

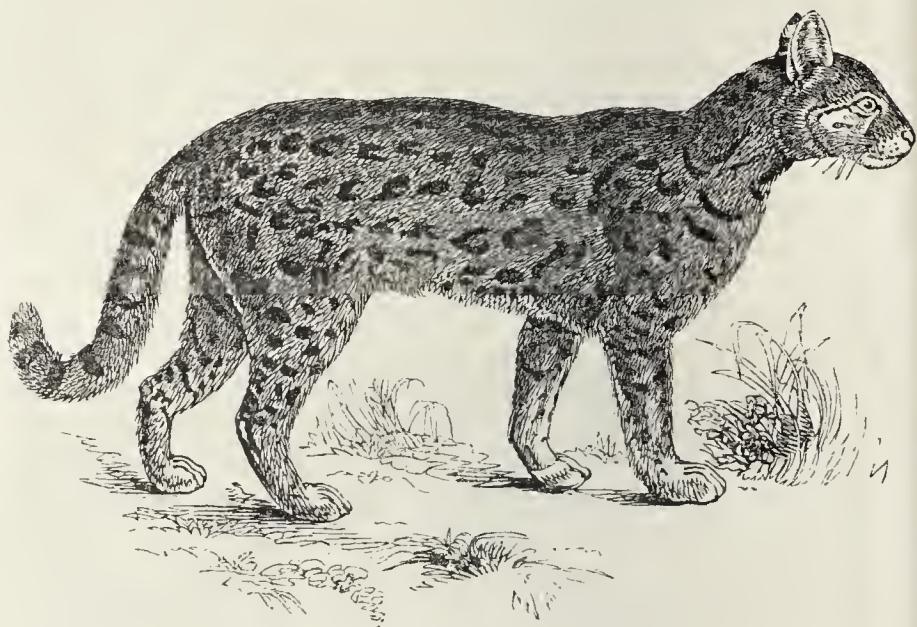
THE CHATI. (*Felis mitis*.)

The chati is regarded by Desmarest as the Chibi-guazu of Azara. It is a native of Paraguay and other parts of South America, and is much smaller than the ocelot. Azara describes it as averaging three feet six inches in total length. The following is Fred. Cuvier's description of a female living in the menagerie of Paris:—"About a third larger than the domestic cat: length, exclusive of tail, rather more than two feet; tail, eleven inches; height to middle of back, about one foot two inches. Ground-colour of fur on the upper parts, pale yellowish; on the lower, pure white; at the roots, dull gray, and very thick and close. Body covered with irregular dark patches: those upon the back entirely black and disposed longitudinally in four rows; those upon the sides surrounded with black, with the centres of a clear fawn, arranged in nearly five rows. Spots upon the lower part of the body, where the ground-colour of the fur is white, full, and arranged in two lines composed of six or seven patches on each side. Limbs covered with nearly round spots of smaller dimensions: on the fore-legs, near the body, two transverse bands. On the throat a sort of half collar, and on the under-jaw two crescent-shaped spots. Behind each eye two bands about two inches long, terminating opposite the ear. Forehead bordered by two lines, between which are numerous spots, and, at their origin, a blackish mark from which the whiskers spring. Outside of the ear black, with a white spot upon the small lobe. Base of the tail spotted with small blotches, which towards the end run into half-rings, which are broadest on the upper surface. Pupil round." (Fig. 42.)

This animal was extremely gentle and familiar, so much so, indeed, that if persons to whom it was attached

passed its cage or did not approach it, it would express its discontent or solicit their attention by a short cry; and when caressed it manifested great delight.

According to Azara, the chibi-guazu is so common, that his friend Nosedá captured eighteen individuals in two years within two leagues of his *pueblo*. Yet it would appear that few are acquainted with the animal, neither



42.—Chati.

the huntsman nor his dogs being able to penetrate its haunts. By day it remains concealed in the most impenetrable and secluded places, only coming abroad after dark, especially when the night is stormy. The chibi-guazu then daringly enters courtyards and destroys the poultry or carries them away. When the night is moonlit they do not venture near inhabited spots, and are besides so wary, that it is hopeless to lie in wait for them with a gun. Men and dogs are most cautiously avoided. Each pair is supposed to have their own exclusive range of territory, for a male and female, and no more, are always caught in the same place. Those which Nosedá caught

soon became reconciled to captivity, and had much of the habits of a cat: nearly the whole of the day they passed in sleep rolled up in ball-like form; twilight and night were passed in pacing to and fro close to the sides of their den. They never quarrelled unless they were much irritated, and then they struck at each other with their fore-paws; when they crossed or interrupted each other's movements in traversing the den, they spit and gesticulated like a common cat. They were fed upon various kinds of flesh, rats, fowls, ducks, young dogs, &c. Cats' flesh gave them the mange, under which they soon sank: snakes, vipers, and toads occasioned violent and continued vomiting, under which they wasted away and died. Dogs equalling themselves in size they would not attack: fowls were their favourite food; these they caught by the head and neck, and instantly killed, stripping their feathers before beginning to eat them. In the night their eyes shone like those of a domestic cat, which in their manners, in their mode of licking the fur and cleaning themselves, they entirely resembled. Azara concludes by stating that a young one which Nosedá caught became so thoroughly domesticated, that it slept on the skirts of his clerical gown and went about loose. No animal could be more tractable; but the neighbours, among whose poultry it made havoc, killed it.

THE PAMPAS CAT. (*Felis Pajeros.*)

This species is also called Jungle-cat, and by the Spanish colonists Gato Pajero. (Fig. 43.)

The fur of this animal is very long, some of the hairs of the back being upwards of three inches, and those of the hinder part of the back four and a half or nearly five inches long. General colour pale yellow-gray. Numerous irregular yellow or sometimes brown stripes run obliquely from the back along the sides of the body. On each side of the face two stripes of a yellowish or cinnamon colour commence near the eye and extend backwards and downwards over the cheeks, on the hinder part of which they join and form a single line, which encircles

the lower part of the throat. Tip of the muzzle and chin white; a spot in front of the eye, and a line beneath the eye, of the same colour; belly, inner side and hinder part of fore-legs, white also. An irregular black line running across the lower part of the chest, and extending over the base of the fore-legs externally; above this line two other transverse dark markings more or less defined on the chest. On the fore-legs three broad black bands, two of which



43.—Pampas Cat.

encircle the leg: on the posterior legs about five black bands externally, and some irregular dark spots internally. Feet yellowish, and under side of tarsus of a slightly deeper hue. On the belly numerous large irregular black spots. Ears moderate, with long white hairs internally; externally of the same colour as the head, except at the apex, where the hairs are black, and form a slight tuft. Tail short, somewhat bushy, and devoid of dark rings or spots; the hairs are in fact coloured as those on the back. On the upper part of the body each hair is brown at the base, then yellow, and at the apex black.

On the hinder part of the back the hairs are almost black at the base, and on the sides of the body each hair is gray at the base; there is then a considerable space of yellowish-white colour: towards the apex they are white, and at the apex black. The greater number of the hairs of the moustaches white. Length, from nose to root of tail, twenty-six inches; of tail, fur included, eleven inches. Height of body at shoulders, thirteen inches. Size about equal to that of the common wild cat of Europe; but the Pampas cat is stouter, its head smaller, and its tail shorter. (Waterhouse.)

This cat was known to Azara, but till recently European naturalists were but little acquainted with it. Fischer, in his 'Synopsis Mammalium,' put it among those species that are not well determined. Azara says that the natives call this animal *Gato pajero*, because it lives on the plains, concealing itself in jungles without entering the woods or thickets. Whether this species exists in Paraguay, Azara states, was a point he could not determine, but that it might perhaps have been formerly seen there before the country became well peopled. He caught four in the Pampas of Buenos Ayres, between 35° and 36° S. lat., and three others on the Rio Negro. They are found, he adds, on both sides of La Plata. Its food consists principally of apereas, or wild guinea-pigs.

According to Mr. Darwin ('Zoology of the Beagle'), this cat inhabits Santa Cruz, Patagonia, and Bahia Blanca.

"This animal," observes Mr. Darwin, "takes its name from *paja*, the Spanish word for 'straw,' from its habit of frequenting reeds. It is common over the whole of the great plains which compose the eastern side of the southern part of America. From the accounts I received I have reason to believe that it is found near the Strait of Magellan, which would give it a range of nearly 1400 miles in a north and south line," for Azara states that it is to be found as high north 30° S. lat. One of Mr. Darwin's specimens was obtained at 50° S., at Santa Cruz: it was met with in a valley where a few thickets were growing. When disturbed it did not run away,

but drew itself up and hissed. The other specimen which Mr. Darwin brought to England was killed at Bahia Blanca.

THE LYNX.

The name of lynx is applied by zoologists to a subdivision of the Felidæ, well marked externally, and regarded by some as entitled to a distinct generic rank. About eight species are described, but there is still considerable confusion among those which are natives of America. The available characters which the lynxes present consist in the pencils which tuft the ears, in the shortness of the tail, and the proportionate elevation of the body at the haunches.

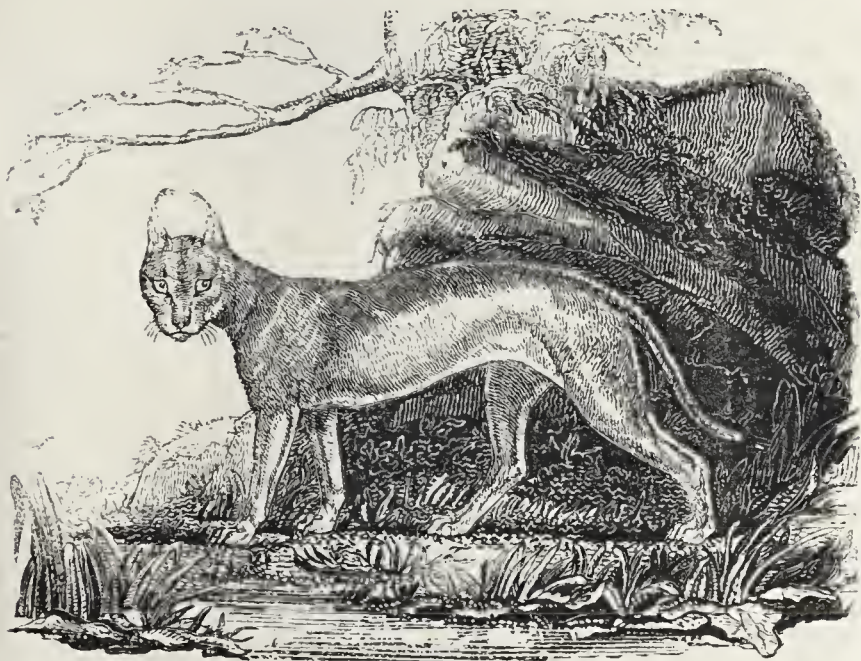
The lynx is one of those animals respecting which many absurd fables have been popularly current, but which are now in no danger of being revived. Pliny (lib. vii., 25) classes the lynx among the monstrous productions of Æthiopia, in the existence of which he seems to have implicitly believed. The lynx is often alluded to by the ancient poets, but from many expressions we easily perceive that they had no very precise ideas about the animal; the lynx of poetry was sometimes a leopard or panther. Virgil calls the lynxes of Bacchus "*variæ*," and in another place alludes to the skin of the spotted lynx ("*maculosæ lyncis*").

The representations of lynxes on antique gems and sculptures are as unsatisfactory and vague as the allusions in classic poetry. Still, however, the lynx described by Aristotle, Ælian, and Oppian was, it must be confessed, not one of these doubtful creatures, but a definite species, and, as we think, the caracal.

THE CARACAL. (*Felis Caracal.*)

This animal derives its modern name from the Turkish, *cara*, black, and *kulash*, ear. Its Persian name has the same meaning, Sugah-gush or Sia-gusch (*sia*, black, *gusch*, ear). It is widely distributed, being found in Persia, India, Barbary, Nubia, Egypt, and the whole of

Africa to Caffraria, Turkey, and Arabia. The general colour of the body is of a pale reddish-brown, with a vinous tinge; the lower parts are paler. Two spots of pure white are near each eye, one on the inner side of and above the eye, the other beneath its outer angle. The edges of the upper lip, the chin, and lower lip are white, as are the insides of the limbs. The whiskers rise from a series of black lines. The ears are long and tapering, and are surmounted by a pencil of long black hairs; their colour externally is black. The tail reaches only to the heel or hock-joint. (Fig. 44.) Tem-



44.—Caracal.

minck gives the measurements as follows:—Length two feet ten inches, of which the tail measures ten; average height about fourteen inches. We have ourselves seen much larger individuals. The eyes of the caracal have a marked nocturnal character, and are large, bright, and scowling in their expression. The limbs are extremely

muscular, and its whole contour denotes great activity. The caracal feeds on small quadrupeds and birds, the latter of which it pursues even to the tops of the trees. It is said to follow the lion and other large beasts of prey for the purpose of feeding on what they leave. The caracal leaps upon its victim and holds it with remarkable tenacity, as was noticed by Ælian. Oppian also alludes to its mode of springing upon hares, deer, &c. According to Temminck, these animals are in the habit of hunting in packs, like wild dogs, and of running down their prey; most probably they creep towards it like the cheetah, and spring suddenly upon it. (Fig. 45.) Pennant, quoting Thévenot, states that they are often brought up tame, and used in the chase of lesser quadrupeds and the larger sort of birds, as cranes, pelicans, peacocks, &c., and that when they seize their prey they hold it fast with their mouth and lie motionless on it. He also adds, on the authority of Hyde, that the Arabians, who call it Anak-el-ard, affirm that it hunts like the panther, jumps up at cranes as they fly, and covers its steps when hunting.

In captivity the caracal is very irritable, often displaying great ferocity. Of its fierceness and strength Dr. Charleton gives evidence, for he relates that he saw one fall on a hound, which it killed and tore to pieces in a moment, although the dog defended itself to the utmost. It would appear, from our repeated personal observations, that few animals of the feline race are more impatient of confinement. Excepting in the instance of very young examples, we never knew one that would suffer the approach of strangers without exhibiting tokens of savage anger. Apparently annoyed by the light, they retire to a corner of their den, and there crouch in sullen and suspicious mood, repelling every attempt towards familiarity by a snarl. When thus irritated the ears are drawn down close to the head, the eyes glare with an expression of malignant fury, and the teeth are displayed, while, at the same time, they utter a deep hissing not unlike that of a cat, and very



45.—Caracal.

different from the growl of the lion or tiger. In a state of nature they avoid the face of man, and, though of comparatively small size, are dangerous enemies when hard-pressed or wounded.

THE BOOTED LYNX. (*Felis caligata*.)

This is a small species with the tail much longer in proportion than in the caracal. The total length is about

three feet, of which the tail measures thirteen inches. The ears are large, red within, and tipped with a pencil of brown hairs; the sole and posterior part of the foot, or leg as it is usually called, are of a deep black. The upper parts of the body are of a deep bluish gray, in some specimens fulvous, clouded with gray and sprinkled with black hairs; the lower parts, throat, and breast are reddish; the thighs are marked with indistinct bands of rather bright brown, and two bands cross the cheeks. The tail is black at the tip, with three or four incomplete rings above it, separated from each other by whitish intervals. (Fig. 46.) The female has generally the tints more yellow; the young have well-defined dark bands on their sides. This species inhabits the south of India, and Africa, from Egypt and Barbary to the Cape of Good



46.—Booted Lynx.

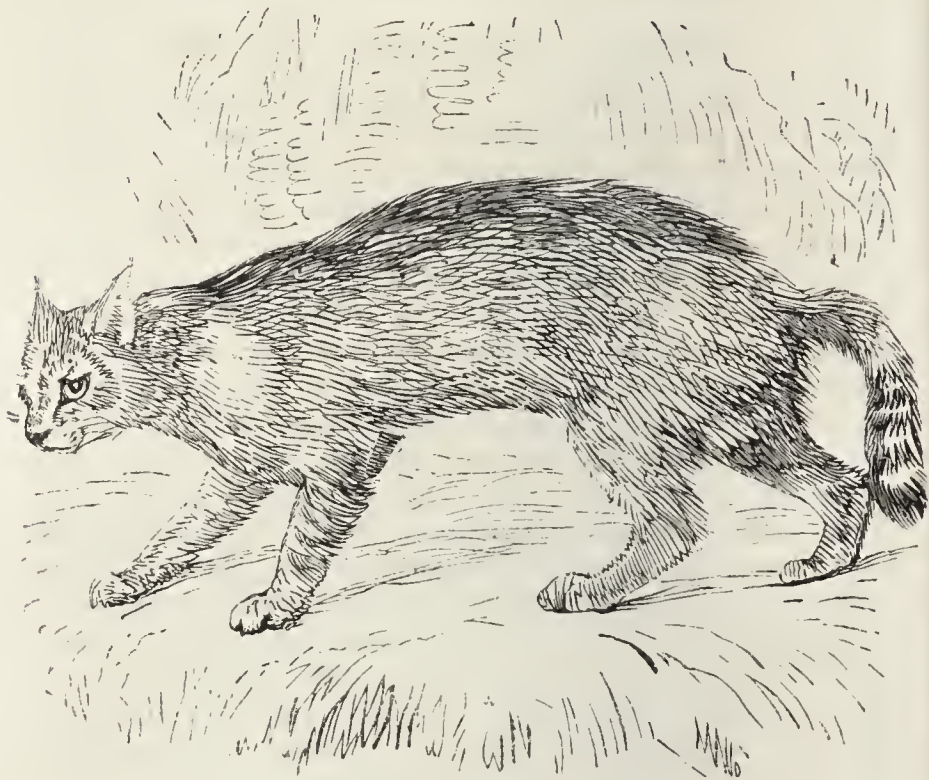
Hope. Birds and small quadrupeds are its prey. It makes havoc among the flocks of wild guinea-fowls in Africa, nor does it refuse the remains of large quadrupeds on which the lion or panther has feasted. Cuvier applied the term *Lynx des Marais* to this species, as well as to the chaus, but at the same time with a remark that some consider the two animals to be distinct.

THE CHAUS. (*Felis Chaus*, Gldenst.)

The Chaus, according to Colonel Sykes, is called *mota rahn manjur*, or larger wild cat, by the Mahrattas. This species has been cleared up by Rppel from the confusion in which it had become involved. He describes it as well covered with fur, the under-coat of which is woolly and soft, but the long hairs are not thickly set. The colour of the woolly hair is a dirty palish ochre yellow, darker on the back, lighter beneath; the long hairs are of the same tint at the base, have a dark-brown middle ring, and are tipped with grayish-yellow, whitish, or saffron, so that the appearance produced is a mixed colouring of grayish-yellow and dirty-white. Many of the hairs on the sides are tipped with black, and, where these are numerous, dusky lines or dashes are produced. The saffron-tipped hairs prevail on the back, and form a yellow stripe from the shoulders to the tail; the nose is black; above and below the eye is a large white spot; a black streak runs from the inner corner of the eye to the nose. The edges of the lips are black, and encircled by a white ring. Cheeks and whiskers white, a few black bristles being interspersed among the latter; back of the ears gray-brow, with black pencils. Externally the limbs are barred with four or five transverse black bands. The tail is one-fourth as long as the body, and annulated towards the termination, which is black and abrupt. (Fig. 47.)

The Chaus inhabits the north of Africa along the course of the Nile, and perhaps more remote districts. It is found in the morasses and bushy lowlands that border the Caspian Sea, and along the banks of its tributary

rivers. It is said to be common in Persia; it is also an inhabitant of the Deccan. Everywhere it appears to give preference to marshes and boggy wastes, where brushwood affords it shelter. It lives upon birds, small quadrupeds, and even fishes: it seldom climbs trees, and is not easily tamed.



47.—Chaus.

THE EUROPEAN LYNX.

(*Felis Lynx*, Temminck, not Linn. and Nilsson; *F. virgata*, Nilsson.)

This is the ordinary lynx of Europe, extending from Scandinavia to Naples and the Pyrenees. Specimens were lately living in the menagerie of the Zoological Society of London from Norway. Gldenstadt states it to exist on the Caucasus, where it is a great:

pest. Besides this lynx, Europe possesses the following:—

The Arctic Lynx (*Felis borealis*, Temminck, not Thunberg; *F. Lynx*, Linn. and Nilsson). It inhabits the north of Scandinavia, and probably Siberia and the forest of Ural.

The great Lynx (*Felis cervaria*, Linn.; *F. borealis*, Thunberg, not Temminck; Siberian Lynx of furriers; Kat-lo of Swedes). It inhabits Norway, Asiatic Russia, and also the Caucasus, according to M. Menestries, who says the Persians call it Vaarchach. (See Nilsson.)

The Pardine Lynx (*Felis pardina*, Temminck). This is the Portuguese Lynx of furriers. It is a well-marked species, inhabiting the mountain regions of Spain, Portugal, and other southern districts. Fine examples are living in the menagerie of the Zoological Society of London, and specimens are preserved in the Paris Museum which were killed in Portugal, not far from Lisbon, in 1808: it is a beautiful animal. Colonel Sykes obtained skins in Andalusia, where it is called Gato clavo. It inhabits the Sierra Morena.

The European or Red Lynx, represented in Fig. 48, is of a dull reddish-gray or rufous tint, with dark rusty-brown spots of an oblong form on the sides, and rounder and smaller spots on the limbs; the under parts are whitish mottled with black. In winter the fur is much longer than in summer, and also fuller, and assumes a hoary tinge, the long hairs becoming tipped with grayish-white; the ears are pencilled; the tail is short, and tipped with black. The length of the head and body is nearly three feet; of the tail, six or seven inches. The European Lynx feeds upon small quadrupeds and birds, and climbs trees easily. Hares, squirrels, rabbits, and also sheep, fall victims to it. When attacked by a dog it lies down on its back and defends itself with its claws. Those we have seen in captivity were very playful. Its fur is valuable in commerce; the colder the climate and season of the year, the finer and fuller it is.

“The limits of the lynx,” observes Cuvier, “in the



48.—European Lynx.

ancient continent are not perfectly ascertained. We know, indeed, that it is common in the forests of the north of Europe and Asia. MM. Blumenbach, Bechstein, and Tiedemann cite instances of their having been killed even lately in Germany, but they are becoming more and more scarce. M. Schintz says that it is not uncommon in the mountains of Switzerland. M. Delabre cites an instance of one killed in Auvergne in 1788.

THE CANADA LYNX. (*Felis Canadensis*, Geoff.)

There is some question about this species, which we believe to be entirely identical with the *F. borealis* of Temminck ; and consequently that the title *Canadensis* is a mere synonym. (Fig. 49.) The range of this boreal lynx is not limited, therefore, to the old world only, but is also extended to the northern parts of America. It is found north of the great lakes, and eastward of the Rocky Mountains: it is rare on the sea-coast, does not frequent the barren grounds, but is not uncommon in the wooded districts of the interior. It is found on the Mackenzie River as far north as 66°. Specimens in the museum of the Zoological Society of



49.—Canada Lynx.

London were procured by Douglas in California. Dr. Richardson states that the early French writers on Canada, who ascribed to this species the habit of dropping from the trees on the backs of deer and destroying them by tearing their throats and drinking their blood, gave it the name of *Loup Cervier*. The French Canadians now term it indifferently *Le Chat* or *Le Peeshoo*. With respect to its attacking deer in the way said, the statement is erroneous; and if really practised by any ferocious animal, is most probably so by the puma. The same habit has been attributed to the wolverene or glutton, from a mistake of Charlevoix in applying to this lynx the name of *Carcajou*, which is proper to the wolverene only. The following is Dr. Richardson's description:—

“The head is round, the nose obtuse, and the face has much the form of that of the domestic cat, but the facial line is more convex between the eyes. The ears are erect, triangular, and tipped by an upright slender tuft of coarse black hairs: they are placed about their own breadth apart, and on their posterior surface they have a dark mark beneath the tip, which is continued near both margins downwards towards their bases. On the body and extremities the fur is hoary, most of the hairs being tipped with white; on the crown of the head, and for a broad space down the middle of the back, there is a considerable mixture of blackish-brown, and on the sides and legs of pale wood-brown. In some specimens these colours produce an indistinct mottling, but in general there are no defined markings. A rufous tinge is also occasionally present about the nape of the neck, and on the posterior parts of the thigh. The tail is coloured like the back, except the tip, which is black. The fur is close and fine on the back, longer and paler on the belly. When blown aside it shows on the middle of the back a dark liver-brown colour from the roots to near the tip, but on the sides it is for the greatest part of its length of a pale yellowish-brown, being merely a little darker near the roots. The legs are thick, the toes very thick and furry, and are

armed with very sharp awl-shaped white claws, shorter than the fur. There are four toes on each foot, those on the hind-foot being rather the largest, but both feet have much spread. Length three feet one inch," &c.

This Boreal or Canadian lynx is by no means courageous: it never ventures to attack large quadrupeds, but preys chiefly on the American hare, for the capture of which it is well provided. "Its large paws, slender loins, and long but thick hind-legs, with large buttocks scarcely relieved by a short thick tail, give it an awkward, clumsy appearance. It makes a poor fight when it is surprised by a hunter in a tree; for though it spits like a cat, and sets its hair up, it is easily destroyed by a blow on the back with a slender stick; and it never attacks a man. Its gait is by bounds straightforward, with the back a little arched, and lighting on all the feet at once. It swims well, and will cross the arm of a lake two miles wide, but is not swift on land. It breeds once a year, and has two young at a time." Its flesh is eaten by the natives, and is white and tender, but destitute of flavour, and closely resembles that of the American hare. The skin of this species is an important article in commerce. The annual importation by the Hudson's Bay Company is stated to be from seven to nine thousand.

Besides this lynx there are others in America.



FAMILY—URSIDÆ.

(BEARS, and allied animals.)—The members of the family group termed Ursidæ are characterized for the most part by their robust figure, by their heavy gait, and plantigrade walk, as well as by the tubercular surface of the grinders—a form connected with diet in great part, at least, consisting of vegetable products. The alimentary canal is simple. Most of the species are expert climbers; they conceal themselves in caves, holes of the

earth, or in hollow trees, in which the females produce their young.

We may here remark that under the general term *Plantigrada* many genera have been associated together, which are by no means nearly related; and some indeed have been placed with the bears, only from their feet being plantigrade, while in reality they belong to another family group. We shall not adopt the terms *Plantigrada* or *Digitigrada* as the names of sections of the *Carnivora*; the animals of which order, as will be shown on a future occasion, resolve themselves into well-marked families.

Genus *URSUS*.

The animals of this genus, viz., the Bears, are distinguished by their ponderous bulk, massive limbs, and heavy gait: they are completely plantigrade in their walk, but their huge claws, which are tremendous weapons, are not retractile; they are, however, well adapted for digging. They are completely omnivorous, devouring flesh, vegetable roots, grain, fruits, and honey. "The bear," says Aristotle, "is an omnivorous animal, and by the suppleness of its body climbs trees, and eats the fruits, and also legumes; it devours honey likewise, having first broken up the hives; as well as crabs, ants, and flesh."

In the 'Tour on the Prairies,' the ranger describes the fondness of the bear for honey in language which, if it be not quite classical, is at all events graphic. "The bears is the knowingest varmint for finding out a bee-tree in the world; they'll gnaw for a whole day together at the trunk, till they make a hole big enough to get in their paws, and then they'll haul out the honey, bees and all."

The dental formula of the genus *Ursus* is as follows:

$$\text{Incisors } \frac{6}{6}; \quad \text{Canines } \frac{1-1}{1-1}; \quad \text{Molars } \frac{6-6}{7-7} = 42.$$

(Fig. 50.) Fig. 51 represents the skeleton of the Polar Bear.

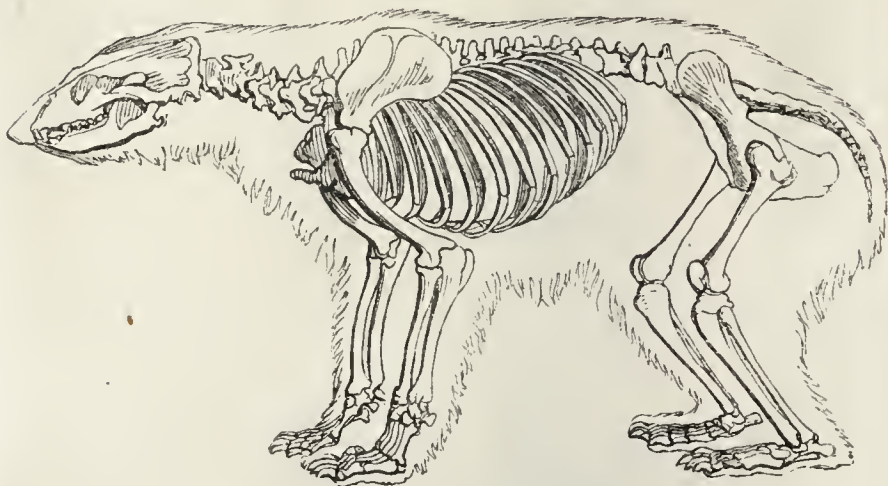


50.—Teeth of Bear.

The feet are 5-toed ; the tail is short ; the limbs are robust ; the eyes are small, but quick and animated ; and the head is large and broad across the top.

Europe, Asia, and America present us each with their

peculiar species of this genus ; but with respect to Africa the existence of any there has been more than doubted, and many attempts have been made to explain away the passages in ancient writers referring to the bear in Africa.



51.—Skeleton of Polar Bear.

Pliny, however, not only asserts that the bear is not an African animal, but expresses surprise at a statement in some records that a hundred Numidian bears were brought to Rome during the consulship of M. Piso and M. Messala, for the Circus, by Domitius Ahenobarbus, curule ædile, who also brought a hundred Æthiopian chasseurs (see lib. viii.). But as Pliny elsewhere states that there are neither boars, nor stags, nor goats, nor bears in Africa, we know how far he can be trusted. That there are bears in Africa, notwithstanding all that has been said to the contrary, is now well established.

Ehrenberg hunted a bear in Abyssinia : his words are, “ Moreover we ourselves have seen in the mountains of Abyssinia, and therefore in Africa itself, an animal most like to a bear—nay, why had I not said a bear ?—and hunted it repeatedly, but in vain. It is called by the

natives Karrai." And he also observes that Forskal has brought tidings of an indigenous Arabian bear.

It is ascertained, moreover, that the bear exists on the range of the Atlas and the Tetuan mountains; and in a letter to the curator of the Zoological Society, from Edward Blyth, Esq., while on his voyage to India, is the following interesting passage:—

"Upon questioning Mr. Crowther respecting the bear of Mount Atlas, which has been suspected to be the Syriacus, he knew it well, and it proves to be a very different animal. An adult female was inferior in size to the American black bear, but more robustly formed, the face much shorter and broader, though the muzzle was pointed, and both its toes and claws were remarkably short (for a bear), the latter being also particularly stout. Hair black, or rather of a brownish black, and shaggy, about four or five inches long; but, on the under parts, of an orange rufous colour; the muzzle black. This individual was killed at the foot of the Tetuan mountains, about twenty-five miles from that of the Atlas. It is considered a rare species in that part; and feeds on roots, acorns, and fruits. It does not climb with facility; and is stated to be very different-looking from any other bear. The skin, like that of the 'Sherif-al-Wady,'* was attempted to be preserved, but unfortunately met with the same fate." ('Zool. Proceeds.' August 10, 1841.)

The genus *Ursus* has been divided into the following subgenera, upon somewhat uncertain grounds, viz. :—*Danis*, *Prochilus*, *Helarctos*, and *Thalarctos*.

THE BROWN BEAR. (*Ursus Arctos*.)

Ours of the French; Bar of the Germans. (Fig. 52.) This species, which is spread through all the mountain districts of Europe, from the arctic circle to the Alps and Pyrenees, and, as it is stated, through Siberia, Kamtchatka, and even Japan to the eastward, was formerly a tenant of the forests and wild hills of our island; whence in the time of the Romans it was im-

* A new species of Ox. Its skin was destroyed by rats.

ported to the capital of the world, in order to gratify the people by its combats in the circus. If Martial may be trusted, its ferocity was sometimes turned against the persons of criminals, who were condemned to a horrid death.



52.—Brown Bear.

The bear appears to have lingered, as did the wolf, longer in Scotland than in England, that country affording it better concealment; for in 'The History of the Gordons' it is stated that one of the family, so late as the year 1057, was directed by the king to carry three bears' heads on his banner, as a reward for his valour in slaying a fierce bear.

In later times, when a virgin queen enjoyed the sports of the bear-garden in Southwark, and a bearward was kept in the establishment of the highest nobility, bears were imported from the Continent to fight with savage dogs for "his lordship's pastime," no less than for the diversion of the commonalty. Such were the recreations of "the good old English gentleman, all in the olden time."

The general habits of the bear are well known : unsocial and solitary, they frequent the gloomiest recesses among the mountains, glens, and caverns, and the depths of the forests : there they dig or enlarge a cave in which to dwell, or usurp the hollow of some huge decayed tree, or form a sort of rude den under the covert of a maze of intertwined branches, lining their habitation with moss. Here they pass the winter, in a state bordering on torpidity ; and it is during this retirement, in January, that the female brings forth her young, which are well formed, and very far from being the shapeless mass supposed by the ancients. The cubs are from one to three in number—mostly, however, two ; at first their eyes are closed, and they remain blind for thirty days. When the bear retires to its winter-quarters on the approach of the cold season it is very fat, but on coming forth in the spring is generally observed to be lean, the fat having been absorbed for the nutriment of the system during the animal's torpidity : but a query here exists,—is the female, who produces her young, and has to attend to them, torpid ? and can she suckle them without receiving any aliment herself ? This is very improbable ; and tends to prove that the seclusion of the animal is neither so absolute nor its torpidity so complete as is generally asserted. That bears support themselves in their winter retirement by sucking their paws is a vulgar error, and need not be seriously refuted.

Unless provoked by aggression, or incited by hunger, the Brown Bear seldom attacks man ; but when roused is most formidable, and displays greater activity and address than might be expected from its heavy clumsy figure. Its strength is prodigious. Mr. Nilsson, a Swede, states that a bear has been seen, bearing a dead horse in his fore-paws, to walk on his hind-legs on a tree stretched across a river. (Fig. 53.) The firm support afforded by the well-developed sole and the form of the hinder limbs (the thigh-bone, though shorter, closely resembling in form that of a man), enables these animals not only to rear themselves up on their hind-feet, but even to walk erect with considerable facility, as was observed by



53.—Bear with dead Horse.



54.—Brown Bear.

Mr. Lloyd ('Northern Field Sports'), who asserts that they can proceed along in that position bearing the heaviest burdens.

In the wilds of the North the bear attains to a prodigious magnitude: Mr. Lloyd killed one of the weight of four hundred and sixty pounds, and they have been found to exceed seven hundred. (Fig. 54.)

Though bears, as Mr. Falk informs us, may reside for years in the neighbourhood of cattle without doing them any injury, yet they will sometimes visit herds solely from the desire of prey, and instances have been known of their climbing upon and tearing off the roofs of cow-

houses, in order to gain admittance to the cattle confined within, which, after slaughtering, they have managed to drag through the opening in the low roof, and carry away.

In the North the bear is hunted and taken in pit-falls and traps of various kinds, and in some countries there is no part of the animal which is without value.

The courage and devotion of the female bear in defence of her young are proverbial. No adventure can be fraught with more danger to the hunter than an attack upon one accompanied by her cubs, for the sake of which wounds and even death are encountered with unflinching resolution, uttering deep growls till the last moments.

The bear climbs trees or rocks with great dexterity, and descends in the attitude in which it ascends, availing itself cautiously of every projection. Those who have seen the bears in the Zoological Gardens climb to the top of their long poles, and fearlessly balance themselves at the top, soliciting food from the visitors, may conceive some idea of the animal's address. It also swims well and fast, and during the heat of summer frequently takes the water for the sake of the bath. When captured young, the bear is easily domesticated, and evinces no trifling share of intelligence. The age to which it attains is very considerable. Individuals have been kept between forty and fifty years in captivity.

A variety (*Ursus Pyrenaicus*, F. Cuv.), considered by some naturalists as a distinct species, inhabits the Pyrenees and the Asturias.

THE SIBERIAN BEAR (*Ursus collaris*)

Approaches close in form to the Brown Bear, with the distinction of a large whitish collar, which passes over the upper part of the back and shoulders, and is completed on the breast. This is not improbably also a variety. (Fig. 55.)

Dr. Richardson describes a Brown Bear which he terms the Barren-ground Bear (*Ursus Arctos? Ameri-*

canus), and which is a native of the barren lands lying northward and eastward of the Great Slave Lake and extending to the Arctic Sea. "It differs," he says, "from the American Black Bear, in its greater size, profile, physiognomy, longer soles, and tail; and from the Grisly Bear also in colour and the comparative smallness of its claws. Its greatest affinity is with the Brown Bear of Norway, but its identity with that species has not been established by actual comparison. It frequents the sea-coast in the autumn in considerable numbers for the purpose of feeding on fish." (Fig. 56.)



55.—Siberian Bear.



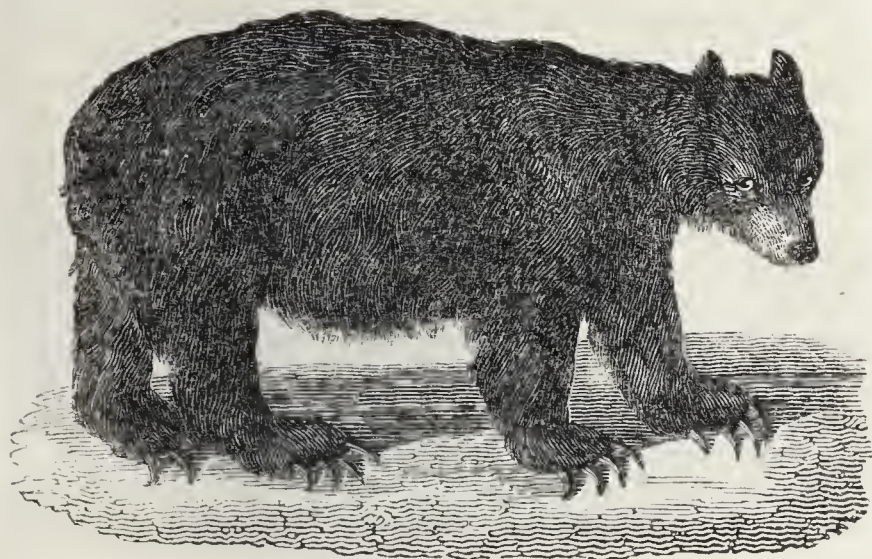
56.—Siberian Bears.

THE AMERICAN BLACK BEAR. (*Ursus Americanus*.)

This species, the Sass of the Chippewayan Indians, the Musquaw of the Crees, is smaller than the Brown Bear; its muzzle is narrower, more arched and pointed, continued in a line without interruption from the forehead; the ears are more distant; and the fur, instead of being shaggy, is soft, smooth, and glossy black.

“The Black Bear,” says Dr. Richardson, “inhabits every wooded district of the American continent, from the Atlantic to the Pacific, and from Carolina to the shores of the Arctic Sea.” Everywhere, however, its numbers have been greatly thinned, owing to the value of the animal’s skin in commerce; besides which the tide of European colonization has driven it to remoter districts, to mountain ranges, and vast forests as yet untouched by the axe, or only recently invaded by the

settler. In some parts of Canada it is still common, and tolerably abundant on the western coast as far as California. It has, we believe, been seen, but that rarely, in the Blue Ridge in Virginia. (Figs. 57, 58, 59.)



57.—American Black Bear.

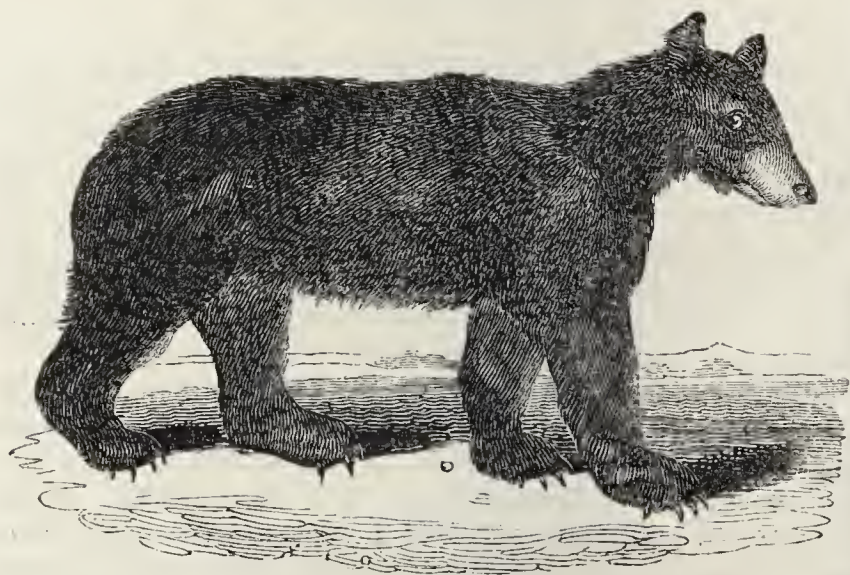
The Black Bear feeds on berries and wild fruits ; and to these it adds roots and eggs ; and though it does not refuse animal food, yet it does not eat it from choice, but necessity ; utterly neglecting it if vegetable aliment can be obtained.

This species is not very daring, and, unless forced to self-defence, or wounded, will seldom venture to attack a man, except in the instance of a female with cubs, the retreat of which she is solicitous to cover.

Its speed is said not to be very great, and it is asserted that a man may easily escape, especially in a willow grove, or in the midst of loose grass, where it stops for the purpose of reconnoitring. Dr. Richardson, however, "saw one make off with a speed that would have baffled the fleetest runner ; and ascend a nearly perpendicular cliff with a facility that a cat might envy." In the Fur Countries this species usually hybernates,

selecting a spot under a fallen tree, where it scratches a hollow in the earth; here it retires at the commencement of a snow-storm, and the snow soon furnishes it with a close warm covering. Its breath makes a small opening in the snow, and the quantity of hoar-frost which occasionally gathers round the opening serves to betray its retreat to the hunter. In more southern districts, where the trees are larger, bears often shelter themselves in the hollow trunks. It has been observed by the Indians, that unless bears are very fat on the approach of winter, they do not hybernate; and as the males are often thin and exhausted in September, should the winter set in before they have time to recover their fat, they migrate southwards in search of food. So carefully do the females with young conceal themselves, that Dr. Richardson's numerous inquiries among the Indians of Hudson's Bay ended in the discovery of only one man who had killed a pregnant bear.

In the northern districts of America, as in Norway and other parts of the continent of Europe, the chase of



58.—American Black Bear.



59.—American Black Bear.

the bear is followed up with the utmost ardour, nor will it surprise us to learn that an animal from which the Indian derives so much benefit (its flesh and every portion being in request), and which in the hour of combat is terrible, should be the subject of many superstitious observances ; pardon being asked for its slaughter, to which necessity impelled the hunters, and every means taken to propitiate the offended spirit of the dead animal.

The Black Bear is subject to varieties of colour ; its fur being sometimes of cinnamon tint, and sometimes of a still more yellow tone. Occasionally it is seen with a white throat-mark.

Cinnamon bears, as well as black, exist in the gardens of the Zoological Society.

THE SPECTACLED BEAR. (*Ursus ornatus*.)

The Spectacled Bear, so called from the two semi-circular marks of buff-colour extending from the muzzle and arching over each eye, is a native of the Cordilleras of the Andes in Chili. Its general fur is smooth, shining, and black; the muzzle is buff-coloured; the throat and chest are whitish. Of its habits nothing is known. Specimens exist in the gardens of the Zoological Society. (Fig. 60.)

In the 'Zool. Proceeds.' for 1833, p. 114, is the notice of a bear, brought to Caracas from the Andes, differing, according to Sir R. Ker Porter, in some points from the *Ursus ornatus*, of which it was evidently a mere variety.



60.—Spectacled Bear.



61.—Grizzly Bear.

THE GRISLY OR GRIZZLY BEAR.

(Ursus (Danis) ferox.)

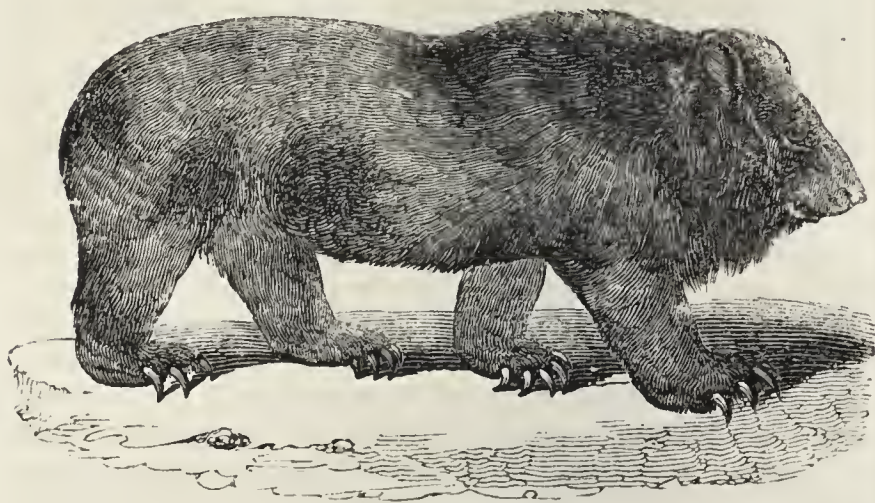
Ursus horribilis, Say; Mesheh Musquaw of the Cree Indians; Hohhost of the Chopunish Indians. This formidable species is a native of the Rocky Mountains and the district eastward of them. To the north it has been observed as far as sixty-one degrees of latitude; to the south it is said to extend as far as Mexico. Everywhere it is dreaded for its great strength and ferocity; even the huge bison falls prostrate before it, and the savage conqueror "drags the dark bulk along" (weighing a thousand pounds) to its haunt, and digs a pit for its reception, repairing to it as hunger dictates, till the whole is consumed. (Fig. 61.) From the hunters of the North-

West, there have been numerous exciting narratives of contests with this ferocious animal. We give only one, supplied by Dr. Richardson, as being a good specimen, and of course to be depended on :—" A party of voyagers, who had been employed all day in tracking a canoe up the Saskatchewan, had seated themselves in the twilight by a fire, and were busy in preparing their supper, when a large grisly bear sprang over the canoe that was tilted behind them, and, seizing one of the party by the shoulder, carried him off. The rest fled in terror, with the exception of a metif, named Bourasso, who, grasping his gun, followed the bear as it was retreating leisurely with its prey. He called to his unfortunate comrade, that he was afraid of hitting him if he fired at the bear, but the latter entreated him to fire immediately, without hesitation, as the bear was squeezing him to death. On this he took a deliberate aim, and discharged his piece into the body of the bear, who instantly dropped its prey to pursue Bourasso. He escaped with difficulty, and the bear ultimately retreated to a thicket, where it was supposed to have died ; but the curiosity of the party not being a match for their fears, the fact of its decease was not ascertained. The man who was rescued had his arm fractured, and was otherwise severely bitten, but finally recovered. I have seen Bourasso, and can add, that the account which he gives is fully credited by the traders resident in that part of the country, who are best qualified to judge of its truth from their knowledge of the parties. I have been told that there is a man now living in the neighbourhood of Edmonton-house, who was attacked by a grisly bear, which sprang out of a thicket, and with one stroke of its paw completely scalped him, laying bare the skull, and bringing the skin of the forehead down over the eyes. Assistance coming up, the bear made off without doing him further injury, but the scalp not being replaced, the poor man has lost his sight, although he thinks his eyes are uninjured. Mr. Drummond, in his excursions over the Rocky Mountains, had frequent opportunities of observing the manners of the grisly bears, and it often happened that in turning the

point of a rock or sharp angle of a valley, he came suddenly upon one or more of them. On such occasions they reared on their hind-legs, and made a loud noise like a person breathing quick, but much harsher. He kept his ground, without attempting to molest them; and they on their part, after attentively regarding him for some time, generally wheeled round and galloped off; though, from their known disposition, there is little doubt but he would have been torn in pieces, had he lost his presence of mind and attempted to fly. When he discovered them from a distance, he generally frightened them away by beating on a large tin box, in which he carried his specimens of plants. He never saw more than four together, and two of these he supposes to have been cubs; he more often met them singly, or in pairs. He was only once attacked, and then by a female, for the purpose of allowing her cubs to escape. His gun on this occasion missed fire, but he kept her at bay with the stock of it, until some gentlemen of the Hudson's Bay Company, with whom he was travelling at the time, came up and drove her off. In the latter end of June, 1826, he observed a male caressing a female, and soon afterwards they both came towards him, but whether accidentally, or for the purpose of attacking him, he was uncertain. He ascended a tree, and as the female drew near, fired at and mortally wounded her. She uttered a few loud screams, which threw the male into a furious rage, and he reared up against the trunk of the tree in which Mr. Drummond was seated, but never attempted to ascend it. The female, in the mean while retiring to a short distance, lay down, and as the male was proceeding to join her, Mr. Drummond shot him also. From the size of their teeth and claws, he judged them to be about four years old. The cubs of a grisly bear can climb trees, but when the animal is fully grown it is unable to do so, as the Indians report, from the form of its claws."

Lewis and Clarke give the measurement of one of these bears as nine feet from nose to tail, but had seen them of larger dimensions. They attain the weight of eight

hundred pounds. The length of the fore-foot is nine inches, of the hind-foot twelve, without including the enormous claws; its breadth seven inches. The tail is short, and lost in the shaggy hair. We query Lewis and Clarke's measurement of nine feet. (Fig. 62.)



62.—Grisly Bear.

The Grisly Bear digs with great facility, but when adult is not capable of ascending trees; a fortunate circumstance for the hunter, for such is the animal's tenacity of life, that it seldom falls until it has received many balls, and dogs have no chance with it except by enabling the hunter to attack it. It would seem, that though the adult Grisly Bears cannot climb trees, that the cubs are able, if the reports of the Indians are to be credited. (Fig. 63.) The cubs, and females with young, hybernate; but the older males often come abroad during winter for food.

An individual of this species, distinguished by his enormous size and ferocity, some time since attracted the attention of all who visited the gardens of the Zoological Society. He had previously been about twenty years in the Tower, when, at the breaking up of the menagerie



63.—Bear and Dogs

there, he was presented by his Majesty William IV. to the Society. His morose indomitable temper was never subdued, but remained unaltered, as if he had been at large surrounded by the savage rocks and gloomy pine-forests of his native regions.

THE SYRIAN BEAR. (*Ursus Syriacus*.)

Though the bear is distinctly alluded to in the Scriptures (see 2 Kings ii. 23, et seq.; also 1 Samuel xvii. 34, et seq.) as a native of Syria, few travellers have noticed the existence of this animal in that country. Hasselquist omits it in his catalogue of the animals given in his 'Travels in the Levant;' nor is it recorded as a species by Desmarest, Fischer, or Lesson. It is in fact only recently that naturalists have become aware that such an animal still prowled about the mountains of Lebanon. (Fig. 64.)

Matthew Paris, however, in his 'England,' relates how Godfrey, during the siege of Antioch, rescued a poor man from the attack of a bear, which, turning upon the warrior, unhorsed him, having lacerated his steed, whereupon he continued the combat on foot, and, though he received a most dangerous wound, succeeded in burying his sword up to the hilt in his savage adversary, and killed him. ('Hist. Engl.,' t. ii. p. 34, fol., Lond. 1640.) Seetzen (a German traveller in 1811) was informed in Palestine that bears existed in the mountains; and La Roque states that in his time they were tolerably abundant upon the higher Lebanon mountains, from which they descended at night in search of prey, and even occasioned apprehension to travellers.

Notwithstanding these casual notices, the animal remained in obscurity till brought before the scientific world by Emprich and Ehrenberg, who, in their 'Symbolæ Physicæ,' give the figure and description of a middle-aged female, killed near the village of Bischerre in Syria, and which they dissected. They observe, that Mount Lebanon is crowned with two snowy summits, one called Gebel Sanin, the other Makmel, both of which they



64.—Syrian Bear.

visited, but found bears only upon the latter, near the village of Bischerre, to the gardens of which they wander in winter, but in the summer remain in the neighbourhood of the snow. The individual killed was about four feet two inches long; her den, which they saw, was formed by great fragments of calcareous rock casually thrown together. The flesh of the animal was tasted, and found to be sapid, but the liver was sweet and nauseous. The gall is in great esteem; the skins are sold, and so is the dung, under the name of Bar-el-dub, the latter being used in medicine, and for diseases of the eye, in Syria and Egypt. The Syrian Bear frequently preys on animals, but for the most part feeds on vegetables; and

the fields of *cicer arietinus* (a kind of chickpea), and other crops near the snowy region, are often laid waste by it.

The Syrian bear is of a uniform fulvous white (sometimes variegated with fulvous): the ears are elongated; the forehead is but slightly arched. The fur is woolly beneath, with long, straight, or but slightly curled hair externally; a stiff mane of about four inches long runs between the shoulders. It was evidently this species which figured in the procession of Ptolemy Philadelphus at Alexandria, and which is called by Athenæus (a Greek writer of Lower Egypt, contemporary with Commodus) a bear of white colour and large size (ἄρκτος μὲν λευκὴ μεγάλη μία); and which some, strange to say, have regarded as the Polar Bear from the shores of the Arctic Sea.



65.—Thibet Bear.

THE THIBET BEAR. (*Ursus Thibetanus*.)

This species was discovered by M. Duvaucel in the mountains of Sylhet, and about the same time by Dr. Wallich in the Nepâl range. (Fig. 65.) The neck of the Thibet bear is thick, and the head flattened, the forehead and muzzle forming almost a straight line; the ears are large; the body compact, and the limbs thick and clumsy; but the claws are comparatively weak. The general colour is black, but the lower lip is white, and a large Y-shaped mark of the same colour on the breast sends up its branch on each side in front of the shoulder. It is not of large stature. Fruits and other vegetable productions appear to constitute its principal food.

THE MALAYAN BEAR.

(*Ursus* (Helarctos) *Malayanus*.)

Bruang of the Malays. This species is found in Sumatra, and with others of the subgenus Helarctos, is distinguished by the extensibility of the lips, the length and flexibility of the tongue, the shortness and smoothness of the fur, and the magnitude of the claws. (Fig. 66.)

The Malayan Bear, or Sun Bear, is said to be a sagacious animal, and to display great fondness for sweets. The honey of the wild bees of its native forests is supposed to be a favourite food, and certainly its long slender tongue well adapts it for the reception of this delicacy. It feeds extensively on vegetables, and is said to be attracted to the vicinity of man by the young shoots of the cocoa-nut trees, to which it is very injurious: indeed Sir T. Stamford Raffles found those of the deserted villages in the Passuma district of Sumatra destroyed by it.

It is often kept domesticated, and is playful and familiar. Of one which lived two years in the possession of Sir T. Stamford Raffles, he writes:—"He was brought up in the nursery with the children, and when admitted to my table, as was frequently the case



66.—Malayan Bear.

gave a proof of his taste by refusing to eat any fruit but mangosteens, or to drink any wine but champagne. The only time I ever knew him to be out of humour was on an occasion when no champagne was forthcoming. He was naturally of an affectionate disposition, and it was never found necessary to chain or chastise him. It was usual for this bear, the cat, the dog, and a small Blue-Mountain bird or lory of New Holland, to mess together, and eat out of the same dish. His favourite playfellow was the dog, whose teasing and worrying was always borne and returned with the utmost good-humour and playfulness. As he grew up he became a very powerful animal, and in his rambles in the garden he would lay hold of the largest plantains, the stems of which he could scarcely embrace, and tear them up by the roots."

The general colour of this bear is jet black, with the

muzzle of a yellowish tint, and a semilunar white mark upon the breast. When adult it measures about four feet six inches along the back.

THE BORNEAN BEAR. (*Ursus* (*Helarctos*) *eurypilus*.)

In general form, habits, manners, and colouring this species closely resembles the Sumatran bear; but is perhaps rather less and has a large orange-coloured patch upon the chest; the fur is extremely close. In captivity it is playful and good-tempered. (Fig. 67.)



67.—Bornean Bear.

The Bornean Sun-Bear not only sits upon its haunches with ease, a position it usually assumes, but can stand upright with great facility. Its senses, especially those of sight and smell, are very acute; the olfactory organs indeed appear to be in continual exercise. By various and amusing gestures it solicits food from spectators; and when a morsel of cake is held at a small distance beyond its reach, it expands its nostrils, protrudes its upper lip and often its tongue, while with its paws it makes every effort to obtain the proffered delicacy. Having gained it and filled its mouth, it places the remainder with singular coolness on its hinder feet, as if to keep it from being soiled by the floor, and brings it in successive portions to its mouth. It often places itself in an attitude of entreaty, earnestly regarding the spectators, and stretching forth its paws ready to receive their offering. It is fond of notice, conscious of kind treatment, and delights to be patted and rubbed; but when vexed or irritated, refuses all attention so long as the offending person remains in sight.

Both this and the preceding species excel in climbing, and they are said to occasion much injury to groves of cocoa-nuts, both by climbing up them, and devouring the top shoot, thereby killing the tree, and also by tearing down the fruit, to the milky juice of which they are very partial.

THE SLOTH-BEAR. (*Ursus* (*Prochilus*) *labiatus*.)

Ours paresseux and Ours jongleur of the French; Aswail of the Mahrattas. (Fig. 68.)

This uncouth animal was first described and figured (from the life) by Bewick, in his 'History of Quadrupeds,' without any name, but as an animal that had hitherto escaped the attention of naturalists. It was then (1791) taken for a sloth, and received from Shaw the names of *Bradypus ursinus*, and *ursiformis*; and from Pennant that of *Ursiform Sloth*. Blainville and others restored it to the genus *Ursus*; Illiger having previously founded the genus *Prochilus* for its reception, a name which is still retained in a subgeneric sense only.



68.—Sloth-Bear.

The Sloth-Bear is a rough, clumsy animal, with short massive legs and huge hooked claws; and possessing great mobility of the snout. It inhabits the mountainous parts of India, and was observed by Colonel Sykes in Dukhun.

It dwells in caves, and its food is said to consist of fruits, honey, and termite ants, for the demolishing whose houses its claws are well adapted. It is said also frequently to descend to the plains, and commit great havoc on the sugar-cane plantations. On these occasions it becomes an object of pursuit to the Indian and European hunters.

The sloth-bear attains to nearly the size of the brown bear of Europe; it is robustly framed. The hair is re-

markably long and shaggy ; on the upper part of the head and neck it is sometimes twelve inches in length, and separates into two portions, one of which overhangs the eyes, imparting a peculiarly heavy appearance to the animal's physiognomy ; while the other forms a thick mane across the shoulders. The general colour is black, intermixed with brown : a triangular mark on the breast is white. The head is carried low ; the back arched ; the muzzle, which is of a dirty yellowish white, is very much elongated : the lips are thin, flexible, and project at all times considerably in front of the jaws ; and possess singular mobility, being capable of protrusion in a tubular form far beyond the muzzle, thus constituting an instrument of suction. The tongue is long, flat, and square at the extremity. We have seen the animal protrude his lips, while at the same time they were kept apart for several minutes together, and on these occasions the interior of the mouth was distinctly visible.

A pair of these animals, which we have observed in captivity, were at times very playful, contending with each other in rude sport with great violence, struggling and endeavouring to throw each other down, and all the while uttering a loud roaring noise ; at other times, huddled together, they passed whole hours in sleep. In India it is often led about by mountebanks and jugglers, as is the brown bear in Europe.

According to Captain Williamson (‘ Oriental Field-Sports ’) these animals are numerous on the boundaries of Bengal, which to the east and west are mountainous, rocky, and overrun with low underwood : their principal resort is under banks, in large burrows or natural cavities ; but they do not hybernate. Their pace is shuffling and awkward, but quick enough to overtake a man on foot. They ascend trees with great facility.

The natives greatly dread them ; the very sight of a bear, however distant, disheartens them, knowing, as they do, the strength and savage disposition of the sable shuffler. Of their ferocity, and the dilatory torments to which they subject their victim, Captain Williamson gives several horrible instances : observing, that they

“ will chew and suck a limb till it is a perfect pulp,” not biting away the flesh, like most beasts of prey.

THE POLAR BEAR.

(*Ursus* (*Thalarctos*) *maritimus*.)

Ours polaire of the French. Within the regions of the Arctic Circle dwells the Polar Bear, one of the largest and most formidable of the group. (Fig. 69.) Formed to endure the most intense severity of cold,



69.—Polar Bear.

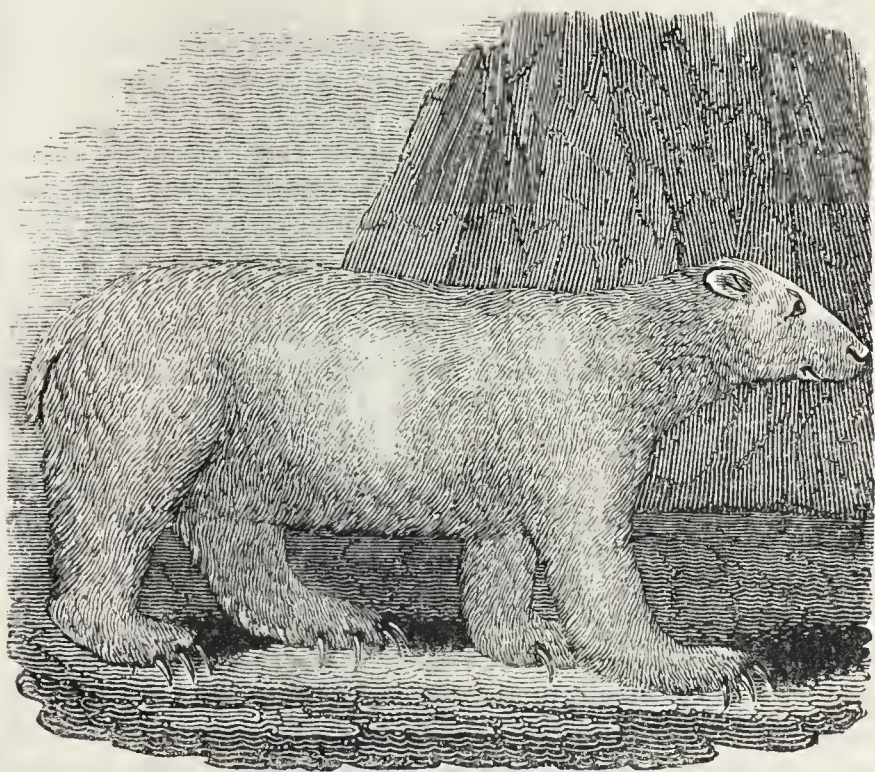
this monarch of a gloomy, desolate realm prowls in sullen majesty over wastes of snow and among ice-glazed rocks in quest of food; he traverses fields of ice along the shore, clambers over rugged icebergs, or even swims out from floe to floe, or from island to island, ravenous for his prey. He dives with admirable address,

and is capable of contending with his prey amidst the rolling waves. The seal forms its favourite diet, together with marine exuviæ, such as dead fishes and cetaceous animals; and he will attack even the walrus himself. In summer mountain-berries are eagerly sought for, nor are sea-weeds or marsh-plants rejected. Of the activity of this bear in the water we may form an idea from a statement by Cartwright, that he saw a polar bear dive after a salmon and kill his fish.

Captain Lyon gives the following account of its mode of hunting the seal:—"The bear, on seeing his intended prey, gets quietly into the water, and swims until to leeward of him, from whence, by frequent short dives, he silently makes his approaches, and so arranges his distance, that, at the last dive, he comes to the spot where the seal is lying. If the poor animal attempts to escape by rolling into the water, he falls into the bear's clutches; if, on the contrary, he lies still, his destroyer makes a powerful spring, kills him on the ice, and devours him at leisure." The same author informs us that this bear not only swims with rapidity, but is capable of making long springs in the water. Captain Sabine states that he saw one about midway between the north and south shores of Barrow's Straits, which are forty miles apart, though there was no ice in sight to which he could resort for rest. (Fig. 70.)

The pace of this bear on shore is a kind of shuffle, but more quick than might be expected; and when at full speed as rapid as the sharp gallop of a horse.

The average length of the polar bear (which has been greatly exaggerated) is about six feet; but it occasionally attains to larger dimensions. Pallas describes an adult female six feet nine inches in length. The greatest length, from nose to tail, recorded by Captain Phipps, is seven feet one inch; the weight of the beast being 610 lbs. Captain Ross records the measurement of one seven feet ten inches, the weight being 1160 lbs.: and Captain Lyon, that one, which was unusually large, measured eight feet seven inches and a half, and weighed 1600 lbs.



70.—Polar Bear.

It is stated on the best authorities, that the male does not hybernate, but that the female, on the approach of the severer season, retires to some rift among the rocks or ice, or digs a lair in the frozen snow; the falling snow drifts over the den, covering it to a great depth, a small aperture for breathing being always open. In this retreat about the latter part of December she brings forth two cubs, and in March quits the den with them, then about as large as a shepherd's dog, and prowls abroad, lean, gaunt, and ferocious; hunger and the presence of her offspring adding fury to her savage temper.

The male wanders about the marshes and adjacent parts until November; he then goes out to sea upon the ice in quest of seals, and becomes very fat. It often happens that he becomes drifted out from the coast on a floating field of ice; and in this way, says Dr. Richardson,

polar bears are often carried from the coast of Greenland to Iceland, where they commit such ravages on the flocks, that the inhabitants rise in a body to destroy them.

Of the devotion of the female polar bear to her young, and of the danger attendant upon the chase of these animals, many travellers have made mention, and recorded various facts which came under their own observation. These, however, are so popularly current, that it is sufficient to allude to them.

It was not until Linnæus published the tenth edition of his '*Systema Naturæ*,' that he had any idea that the polar bear was distinct from the brown bear, the only species he appears to have known. Martens, however, had previously distinguished it, and indeed was the first to characterize it from actual observation ('*Spitzbergische oder Grönländische Reisebeschreibung*,' Hamb., 1675).

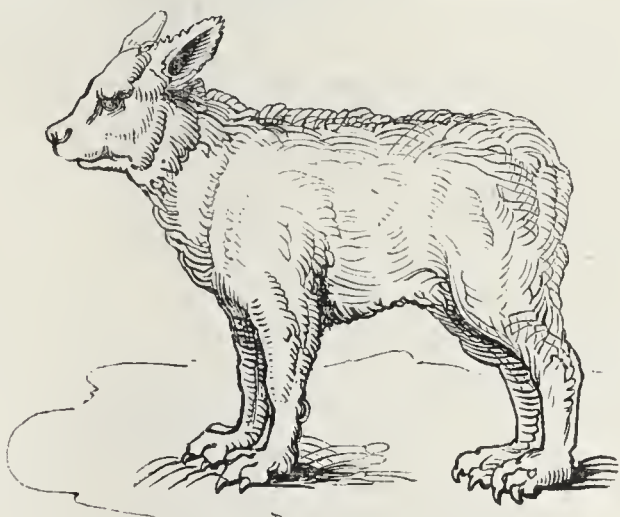
This species is of a more lengthened form than that of the others; the head is very much elongated and flattened, the ears and mouth comparatively small, the neck very long and thick, and the sole of the foot very large. The fur is silvery white, tinged with yellow; close, short, and even, on the head, neck, and upper part of the back; long, fine, and inclined to be woolly on the hinder parts, legs, and belly. The sole of the foot is almost entirely covered with long hair affording the animal a firm footing on the ice. The claws are black, not much curved, thick, and short. Captain Lyon's crew found none of the terrible effects (skin peeling off, &c.) from eating the flesh, ascribed to it by some of the earlier voyagers.

A PRETENDED HYBRID BETWEEN A DOG AND A BEAR.

From time to time supposed hybrids of this sort have been exhibited, and there is generally an inclination to believe in the existence of creatures the offspring of such a parentage. That two animals so different in structure, dentition, general habits and instincts as the dog and bear

should breed together is improbable—nay, contrary to the laws of nature and to physiology. We are not, however, surprised that at a time when a belief in monsters, both of the human and brute creation, was almost universal, that men of education should have credited the existence of a dog-bear.

Our figure (Fig. 71) is copied from a curious work, entitled '*Histoires Prodigueuses extraictes de plusieurs fameux Autheurs, Grecs et Latins, sacrez et profanes, divisées en cinq tomes, le premier par P. Boaistuau. Tome Premier, Paris, 1582.*' It would appear that M.



71.—Pretended Hybrid of Bear and Dog.

Pierre Boaistuau, who visited England in the reign of Elizabeth, and was introduced to the court, was shown two dogs, asserted to be of the parentage in question, both of which were presented to M. le Marquis de Trans: one this nobleman gave to M. le Comte d'Alphestan; the other, of which the figure is given by M. Boaistuau, he took to France. He describes the beast as extremely ferocious, and in form intermediate between the dog and bear, the latter being its male parent. There can be but little doubt that the bearwards palmed off these animals upon him and others as hybrids, but which were really

dogs selected for their bear-like appearance—an appearance increased by cropping the ears and tail, and other skilful artifices.

The genus *Ursus* is rich in the reliquiæ of extinct species. These occur for the most part in various caverns in Germany, Hungary, and England, along with the bones of other Carnivora, as the wolf, hyæna, tiger, glutton, &c., and also of herbivorous animals, though these are less in number. In most of these caves (that of Kirkdale excepted, where the remains are principally those of an extinct species of hyæna) the bones of the bear tribe are the most prevalent. In the vast cavern of Gaylenreuth this is remarkably the case, the bones being referable to three distinct species, which have been termed *Ursus priscus*, *U. arctoïdes*, and *U. spelæus*. They lie for the most part confusedly in a bed of animal earth, and are often encrusted with stalagmite, which lines the roof and walls of the cave. Though scattered and broken, these bones exhibit no tokens of having been rolled. Professor Goldfuss states that with regard to the cave of Gaylenreuth, if we assume 1000 buried individuals of the various species found there, the proportion will be as follows:—*Hyæna spelæa*, 25; *Canis spelæus*, 50; *Felis spelæa*, 25; *Gulo spelæus*, 30; *Ursus priscus*, 10; *Ursus arctoïdes*, 60; *Ursus spelæus*, 800.

Of these extinct bears, the skull of the *Ursus spelæus* is distinguished by the bold elevation of the forehead, and its size indicates the animal to have greatly exceeded any living species. The skull of the *Ursus arctoïdes*, though as large as that of *U. spelæus*, has the forehead much less elevated. The skull of *Ursus priscus* is smaller, and approaches in size and contour that of the common brown bear, but is more flattened along the upper surface.

It may here be observed that certain serrated canine teeth attributed to bears, under the names of *Ursus Etruscus* and *Ursus cultridens*, by Cuvier and others, and to the genus *Felis* by Bravard, are, according to Kaup, the relics of an animal allied to the Megalosaurus, one of the Saurian reptiles, but of a distinct genus, to which he has given the name of *Machairodus*. In Fig. 72, *a* is a



72.—*a*, Tooth of *Machairodus* ; *b*, Outline of a cast of the perfect Tooth ; *c*,
Tooth of *Megalosaurus*.

tooth of *Machairodus*, natural size, imperfect below ; *b*, the outline of a cast of the perfect tooth ; *c*, a tooth of *Megalosaurus*, natural size. Professor Owen, however, regards the teeth (*a*, *c*) as having belonged to a mammiferous animal, not however a bear ; and the proof is afforded by the cast (*b*), which shows that the tooth was originally lodged in a socket, and not anchylosed to the substance of the jaw, and that the fang is contracted and solidified by the progressive diminution of a temporary formative pulp, and does not terminate in an open conical cavity, like the teeth of all known Saurians, which are lodged in sockets.

Genus PROCYON.

Dental formula :—Incisors $\frac{6}{6}$; Canines $\frac{1-1}{1-1}$; Molars $\frac{6-6}{6-6} = 40$. The two true molars on each side are equal, or nearly so ; and the carnassière nearly resembles the true molars, not being suited to cutting flesh.

THE RACCOON. (*Procyon lotor*.)

Raton of the French ; Mapach, Yllamaton, Maxile, and Cioatlamacazque of the Mexicans, according to Hernandez.

Notwithstanding Buffon's assertion to the contrary, the Raccoon inhabits Canada as well as the warmer regions of America ; its range being from about 50° north lat., extending through Mexico and the United States, and thence, as it would seem, into South America as far as Paraguay. In size these animals equal a common fox, having a stout body with moderate limbs, and a plantigrade, or rather semi-plantigrade, walk ; for, though the sole is naked, it is only when the racoon rests that it is totally applied to the ground. The toes, five in number, are armed with sharp claws ; the muzzle is acute, the nose tapering beyond the lips, and flexible ; the eyes are moderate, with a circular pupil ; the ears are short, erect,

and rounded ; the whiskers long ; the tail moderate, and somewhat bushy. General colour brownish gray, the tail being tinged with a blackish tint ; muzzle dirty white ; a black or dark brown mark across the eyes and cheek, and another between the eyes, extending from the forehead ; under parts pale gray. (Fig. 73.)

The racoons are nocturnal in their habits, sleeping out the day in their holes, and prowling at night in search of food. The borders of the sea and the margins of swamps and rivers are their favourite localities ; and they prey upon small animals, birds, eggs, and insects, adding roots, fruits, and sweet succulent vegetables to their diet. Nor are crabs, oysters, and other shell-fish, less acceptable, for which they visit the shores at low-water. To the partiality of the racoon for oysters we can ourselves testify ; for some years since we repeatedly tried one of



73.—Raccoon.



74.—Raccoon.

these animals with the hard-shelled mollusk in question, which it greedily devoured. Its first action was to crush the hinge of the shell between its teeth: which done, it wrenched the two valves so far asunder as to enable it to scrape out the mollusk with its claws. (Fig. 74.)

In the description of a tame raccoon by M. Blanquart des Salines, we are informed, "It opens oysters with wonderful skill; it is sufficient to break the hinge, its paws complete the work. It must have an excellent sense of touch. In this operation rarely does it avail itself of sight or smell; for instance, it passes the oyster under its hind-paws, then without looking seeks by its hands the weakest place; it there digs in its claws, forces apart the valves, and tears out the fish in fragments,

leaving nothing behind." This was precisely what we ourselves witnessed.

The racoon is asserted to have the habit of dipping its food into water before eating it, whence it has received the appellation of *lotor*, or washer ; but although we have had numerous opportunities of observing the animal in captivity, we never saw this mode of proceeding.

Though incapable of grasping objects with its paws, the racoon can hold its food between them pressed together, in doing which it usually sits upon its haunches like a bear, and in this attitude it very often feeds.

Of the senses of this animal, that of smell is the most developed, and is very acute : the eyes, though the pupil is round, are better adapted for twilight or night than for the glare of day ; indeed, a strong light distresses and confuses this animal exceedingly. In its natural state, in fact, the racoon is nocturnal, and it is most probably from the circumstance of the eyes being incapable of sustaining daylight, that blindness from cataract (opacity of the lens) is so common in these animals in a state of captivity, when they are liable to be roused up, and are often kept awake during the whole or greater part of the day.

The gait of the racoon on the ground is oblique, and when it moves quickly its mode of progression consists of a series of bounds, reminding us of the lemurs, but with nothing of their grace and lightness. When taken young this animal is easily tamed, becomes playful, and is fond of being noticed and caressed, but is at the same time very capricious and easily offended ; and to some persons, without any apparent cause, it will show from the first marked signs of hostility. When enraged or desirous of attacking a person, the racoon advances, as we have often witnessed, with arched back and bristly hairs, and with its chin or under-jaws close to the ground, uttering gruff sounds of displeasure. If once injured, it seldom forgives its enemy.

It greedily attacks poultry within its reach, and is as cunning and destructive as the fox ; though, according to M. Blanquart des Salines, it only devours their heads, which agrees with Dr. Richardson's observations.

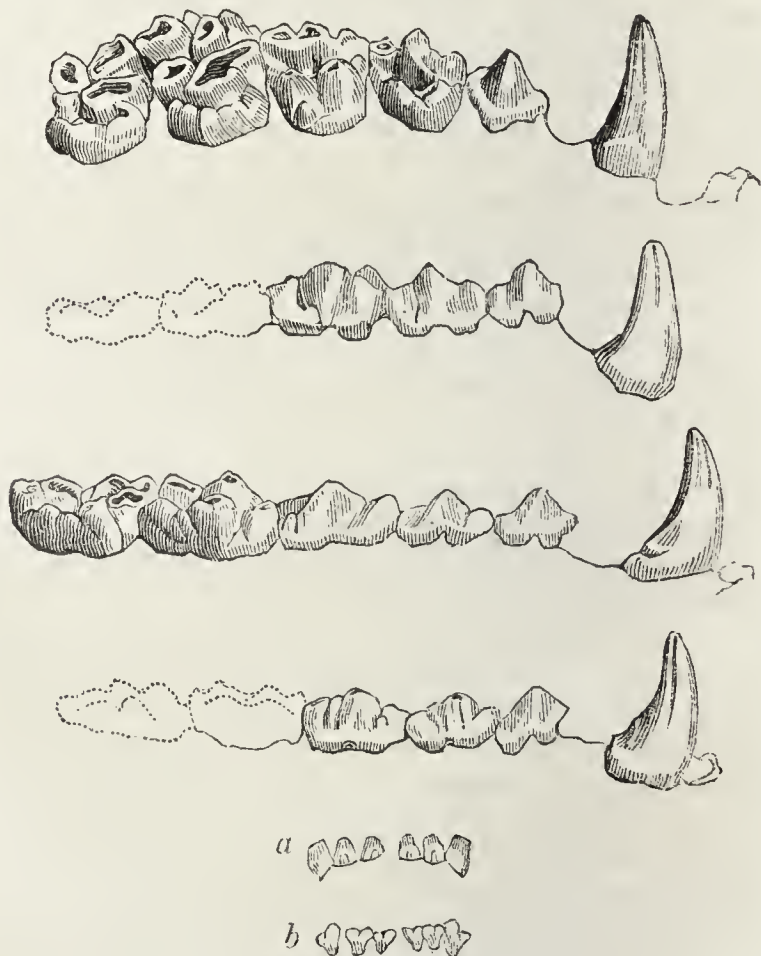
When roused from its diurnal indolence, the racoon is restless, inquisitive, and prying ; it climbs with the greatest skill, in the same manner as a bear, ascending and descending a tree, a pole, or branches fastened in its apartment, with the utmost address. It is apt to become very fat, and its flesh is said to be palatable. The fur is used in the hat-manufacture, and the skins are imported in tolerable numbers.

Buffon, in speaking of the localities tenanted by the racoon, says :—“This animal is originally from the southern regions of America : it is not found in the Old World ; at least, travellers who have spoken of the animals of Africa and the East Indies make no mention of it. It is, on the contrary, very common in the warm climates of America, and especially in Jamaica, where it inhabits the mountains, whence it descends to feed upon the sugar-canes. It is not found in Canada, nor in the other northern portions of this continent ; nevertheless it does not greatly fear the cold ; M. Klein brought up one at Danzig, and that which we had has passed a whole night with its feet locked up in the ice without experiencing any ill effects.” As respects the racoon not inhabiting Canada, Buffon is most certainly wrong. It is even eaten in Canada, as we are positively informed by a gentleman who has seen it brought to the table. Dr. Richardson informs us that the racoon “inhabits the southern parts of the fur districts, being found as far north as Red River, in lat. 50° , from which quarter about one hundred skins are procured by the Hudson’s Bay Company. If there is no mistake as to the identity of this species, the racoon extends farther north on the shores of the Pacific than it does on the eastern side of the Rocky Mountains. Dixon and Portlock obtained cloaks of racoon-skins from the natives of Cook’s River in lat. 60° N. ; and skins, supposed to be those of racoons, were also seen at Nootka Sound by Captain Cook. Lewis and Clarke expressly state that the racoon at the mouth of the Columbia is the same with the animal so common in the United States.” To this Dr. Richardson adds, “its flesh, when fed on vegetables, is reported to be good.”

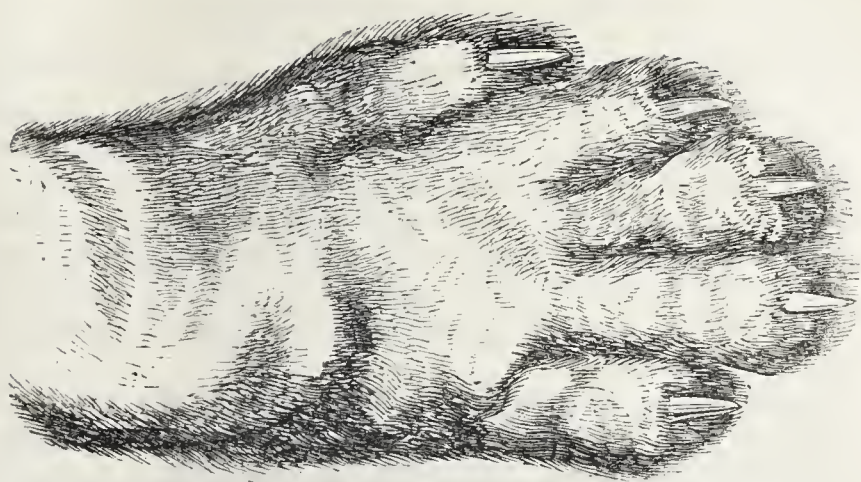
In captivity the racoon exhibits much cunning and a resentful temper. M. Blanquart des Salines, who kept one of these animals, states that a servant had one day struck his racoon a few blows with a whip: "in vain did the man afterwards attempt a reconciliation; neither eggs, nor food most coveted by the animal, availed in pacifying it. At his approach it enters into a sort of fury; with sparkling eyes it darts at him, and utters loud cries of suffering. Whatever is presented to it at that time it refuses until its enemy has disappeared. Its accents of anger are very singular; sometimes one might fancy them the whistling of the curlew, at others the hoarse bark of an old dog. If any one beats it, or if it is attacked by an animal which it thinks stronger than itself, it opposes no resistance; like a hedgehog, it conceals its head and its paws, and forms its body into a ball; no cry escapes it, and in this position it would suffer death." With much caprice there is no little cunning in the character of the racoon, mixed with malice and a fondness for destruction. The writer above quoted informs us that the chain of his racoon is sometimes broken, "and that liberty renders it insolent: it takes possession of a room, and will suffer no one to come near it; it is not without difficulty that it can be refettered. Since it has lived with me, its slavery has frequently been suspended. Without losing sight of it, I often allow it to walk with its chain, and every time a thousand little gambols express to me its gratitude. It is quite the contrary, however, when it escapes itself: it then rambles sometimes for three or four days together over the neighbouring roofs, and descends at night into the court-yards, enters the poultry-roosts, strangles the fowls, and eats their heads, attacking more especially the Guinea fowls. Its chain did not render it more gentle, but only more circumspect; it then employed artifice, and familiarized the poultry with it, permitting them to come and partake of its repast; and it was only after having inspired them with the greatest security that it would seize a fowl and tear it to pieces. Some young cats have experienced from it the same sort of treatment."

Genus AILURUS.

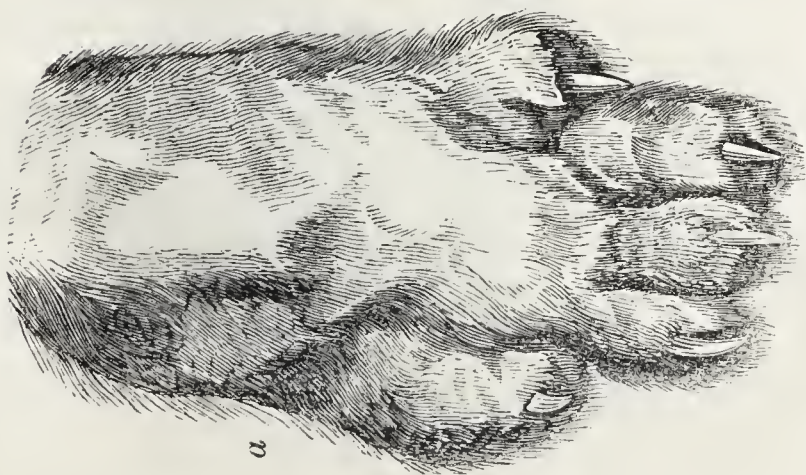
Dental formula:—Incisors $\frac{6}{6}$; Canines $\frac{1-1}{1-1}$; Molars $\frac{5-5}{5-5} = 36$. In dentition this genus approaches that of the racoons; but the molars have their crowns studded with sharp tubercles, which, as in General Hardwicke's specimen, become worn down by long use. The molars of the upper jaw are broad and large, those of the lower jaw narrow. Fig. 75 represents the teeth of the Panda; *a* and *b* are the incisors, or front teeth, of the upper and lower jaw.



75.—Teeth of Panda.



76.—Feet of Panda,



THE PANDA. (*Ailurus fulgens*.)

The Panda is an inhabitant of the Himalayan Hills, between Nepâl and the Snowy Mountains, and was first discovered by General Hardwicke, who published a description in the fifteenth volume of the 'Linn. Trans.' Subsequently M. Duvaucel sent the skin of the animal to Paris, and a description and figure were published by F. Cuvier in the fiftieth number of the 'Histoire des Mammifères,' which appeared prior to the paper by General Hardwicke.

The panda is a short-muzzled animal, covered with full soft fur, and having a tail of moderate length, resembling a lady's boa. In size the animal equals a badger, and is of a robust figure. Its limbs are stout: its feet five-toed; but the soles, instead of being naked, are covered with thick close wool, of a pure white in some specimens, of a grayish white in others, forming a singular contrast to the deep black of the legs and under surface. The claws are short, sharp, and semiretractile. Fig. 76: *a* represents the anterior foot, left side; *b*, the hinder foot, right side; *c*, the sole of one of the posterior



77.—Panda.

feet, showing its woolly covering. The ears are short, pointed, and lined and tufted with white fur. The colour of the upper surface is beautiful fulvous red, the head being much paler; the muzzle is white, with a red dash beneath the eyes; the tail is banded red and yellow, but not very strongly; the limbs and under parts are abruptly black. The fur, which is very full and deep, consists of a woolly undercoat, with long soft hairs overlaying it. (Fig. 77.)

We learn from General Hardwicke that the haunts of the panda "are about rivers and mountain-torrents." It lives much in trees, and feeds on birds and the smaller mammalia; it is frequently discovered by its loud cry or call, resembling the word *wha*, often repeating the same; hence is derived one of the local names by which it is known. It is also called the Chitwa.

Genus NASUA.

THE BROWN COATI. (*Nasua fusca*.)

The Coatis, or Coati-mondis (*Nasua*), are restricted to the warmer regions of the American continent, and in dentition and general economy approximate to the Racoons.

These curious animals, formerly placed by Linnæus with the Viverræ, cannot easily be confounded with those of any other group.

They may be known at once by the peculiar elongation of their snout, which projects considerably beyond the lower jaw. This snout is not, as in the hog, supported by a continuation of the nasal bone, but is a cylindrical and flexible proboscis, with a truncate extremity, forming a sort of disc where the nostrils open, and altogether giving a singular character to their physiognomy. They turn it about in various directions while in search for food, and root with it in the earth in quest of worms and insects. The eyes are small, but quick; the ears moderate and rounded; the body long, deep, and compressed; the tail long; the limbs short and stout; the toes five on each foot, and armed with large powerful claws, well adapted for digging.

The fur is rather coarse, but long, full, and close; the tail is ringed with alternate bands of dark and pale tints—in the red coat (*Nasua rufa*) of rufous, in the brown coat (*N. fusca*) of dusky, brown. The canine teeth are remarkable for their size and sharpness, especially those of the upper jaw, which are compressed, and have a cutting edge both before and behind.

In captivity these animals sleep much during the day, and are most active as the evening advances, at which time they traverse their cage, turn their snout from side to side, and pry into every corner. They do not, however, pass the whole of the day in sleep, but are active for hours together, retiring to rest only at intervals. Their temper is capricious; we have, indeed, seen some individuals tolerably good-tempered, but most are savage, and their bite is very severe.

In drinking, the coat laps like a dog; but as its long snout would be in the way during this operation, it turns it up, so as to prevent its being submerged.

These animals are highly gifted with the sense of smell; they examine everything with their long nose, which is in almost perpetual motion. Their temper is irritable and capricious; they cannot be trusted, even by those with whose persons they are the most familiar; and, consequently, are not to be touched without great caution. Their voice, seldom exerted, is, under ordinary circumstances, a gentle hissing; but when irritated or alarmed, they utter a singularly shrill cry, something like that of a bird. They defend themselves vigorously when attacked by a dog, or any animal, and inflict desperate wounds. Like the racoon, they are said to be fond of the juice of the sugar-cane, but we know not on what authority. Azara does not allude to this partiality; it is, however, far from being improbable. In climbing they descend head foremost, being in this respect unlike the bear, which animal they far surpass in activity, being indeed better climbers than even the cat, and exceeded among their own tribe only by the kinkajou, whose prehensile tail gives it a great advantage.

In their native climate they tenant the woods, living

for the most part in small troops among the trees, which they climb with great address, and prey upon birds which they surprise, rifling also their nests of eggs or unfledged young. Worms, insects, and roots form also part of their diet.

The colour of the brown coati (*N. fusca*) is very variable, the brown being more or less tinged with yellow, and sometimes shaded with black; the under surface is yellowish gray; the snout is generally black, and several spots or marks of grayish yellow encircle the eye. It is a native of Brazil, Guiana, and Paraguay.

THE RUFOUS COATI. (*Nasua rufa*).

We have already alluded to the genus *Nasua* as one of those forms which link the Ursidæ, on one side, with the Mustelidæ, or Weasel tribe, on the other. (Fig. 78.)



78.—Rufous Coati.

The rufous coati in habits and manners agrees with the brown coati, living in pairs or small troops in the forests of South America, and climbing with great facility; but their mode of climbing does not resemble that of the cat or the squirrel, or of any of the light-limbed and sharp-clawed animals;—they do not run up a tree and bound from branch to branch, but proceed in the same heavy manner as on the ground; and it is because they can apply the palm of their paws, or the sole of their hind-feet, fairly to any object (not, however, grasping it), that they are enabled thus to climb. They use their feet, in fact, in the same manner as man, and their mode of climbing resembles his, except that their paws do not grasp; in descending, they generally come down hind-quarters foremost, carefully availing themselves of every projection. The bear always does so, and, as far as we have observed, the racoon also.

Genus CERCOLEPTES.

Dental formula :—

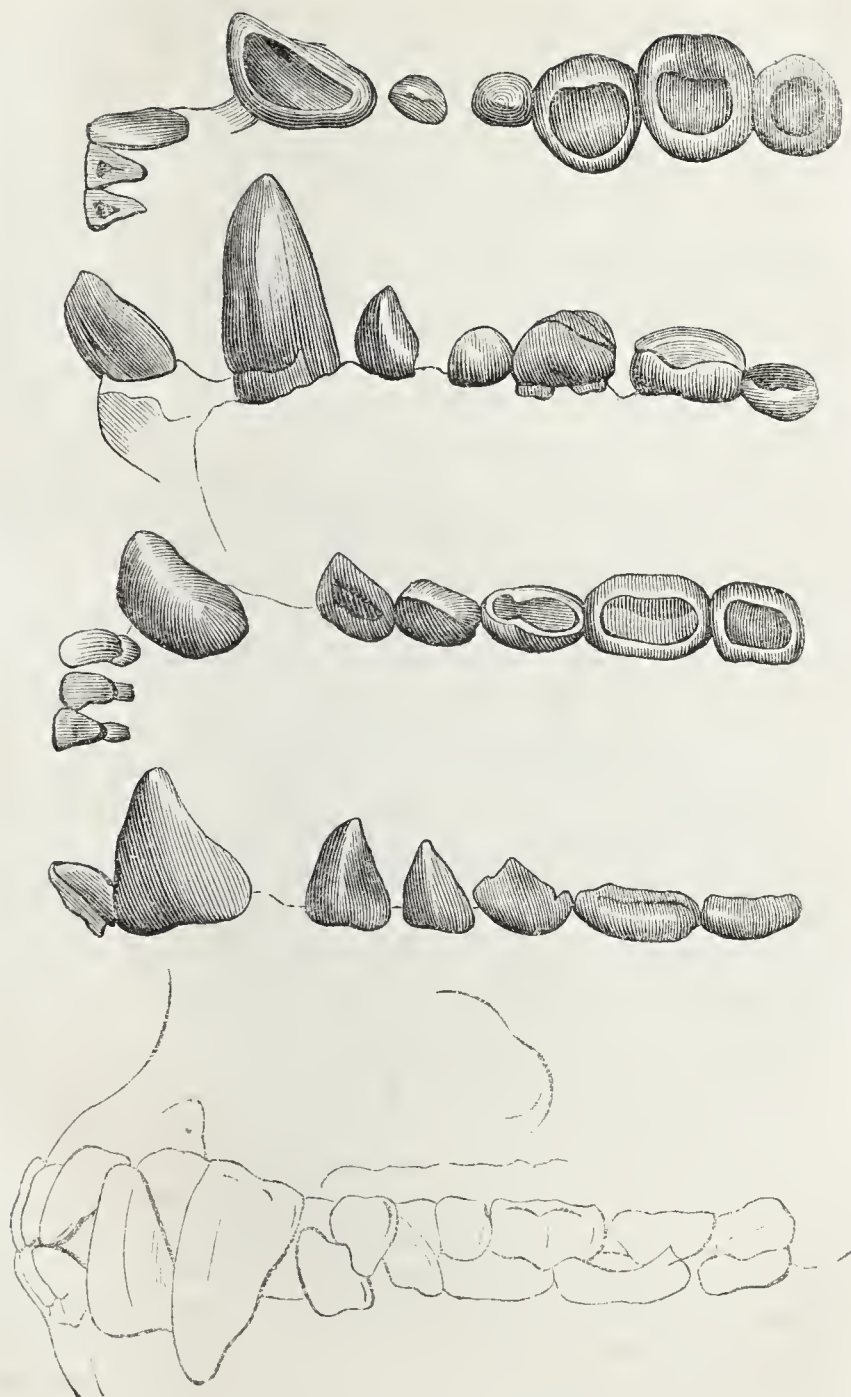
$$\text{Incisors } \frac{6}{6}; \text{ canines } \frac{1-1}{1-1}; \text{ molars } \frac{5-5}{5-5} = 36.$$

Fig. 78* represents the teeth of the Kinkajou.

THE KINKAJOU. (*Cercoleptes caudivolvulus*.)

Of the genus *Cercoleptes* one species only is known, the Kinkajou, Potto, Mexican Weasel, or Yellow Macauco of Pennant; the true affinities and situation of which in the system of Mammalia seem sadly to have puzzled naturalists.

The kinkajou is a native of Southern and Intertropical America, where it appears to be extensively spread, and is known under different appellations. In New Granada it is called by the native Indians, Gushumbi, and Manaviri in the mission of Rio Negro. In its manners it much resembles the coati-mondi (*Nasua fusca*), but differs from that animal not only in the shape of the head, which is short and compact, but also in having a prehensile tail.



78*.—Teeth of Kinkajou.

Of recluse and solitary habits, the kinkajou lives for the most part among the branches of trees in large woods or forests, and is in every respect well adapted for climbing: being, however, decidedly nocturnal, it is but little exposed to the observation even of those who sojourn among the places frequented by it. During the day it sleeps in its retreat, rolled up like a ball, and, if roused, appears torpid and inactive. As soon, however, as the dusk of evening sets in, it is fully awake, and is all activity, displaying the utmost restlessness and address, climbing from branch to branch in quest of food, and using its prehensile tail to assist itself in its manœuvres. Few mammalia are more incommoded by light than the kinkajou: we have seen the pupils of the eyes contracted to a mere round point, even when the rays of the sun have not been very bright, while the animal at the same time testified by its actions its aversion to the unwelcome glare.

In size the kinkajou is equal to a full-grown cat, but its limbs are much stouter and more muscular, and its body more firmly built. In walking, the sole of the foot is applied fairly to the ground, as in the case of the badger. Its claws are strong and curved, the toes on each foot being five. The ears are short and rounded. The fur is full, but not long, and very closely set. There is no animal among the Carnivora (as far as our experience goes) in which the tongue is endowed with more remarkable powers of extension. Among ruminating animals, the giraffe is, as we know, capable of extending this organ to a very great length, and of using it much in the same manner as the elephant does the extremity of his proboscis, drawing down by it the twigs and boughs of the trees, upon the leaves of which the creature feeds; in like manner can the kinkajou thrust forth its tongue, a long and slender instrument, capable of being inserted into crevices or fissures, in search of insects, reptiles, or the eggs of birds. Baron Humboldt informs us that this animal is an extensive devastator of the nests of the wild bee, whence the Spanish missionaries have given it the name of "honey-bear," and that it uses its long tongue to lick up the honey from the cells of the comb. In

addition, however, to this food, birds, eggs, small animals, roots, and fruits constitute the diet of the kinkajou ; and, as we have seen, it will draw these articles towards it with its tongue, when presented just within its reach. In drinking it laps like a dog, and also makes use of its fore-paws occasionally in holding food, and even in conveying it to the mouth, as well as in seizing its prey. In its aspect there is something of gentleness and good-nature ; and in captivity it is extremely playful, familiar, and fond of being noticed. In its natural state, however, it is sanguinary and resolute. (Fig. 79).



79.—Kinkajou.

An individual of this species died at the gardens of the Zoological Society : it had lived in the possession of the Society about seven years, and was remarkable for gentleness and its playful disposition. During the greater

part of the day it was usually asleep, rolled up in the inner partition or box of its large cage; this, indeed, was invariably the case in the morning, unless purposely disturbed, but in the afternoon it would often voluntarily come out, traverse its cage, take food, and play with those to whom it was accustomed. Clinging to the top wires of its cage with its hind-paws and tail, it would thus suspend itself, swinging backwards and forwards, and assuming a variety of antic positions. When thus hanging, it could bring up its body with the greatest ease, so as to cling with its fore-paws as well as the hind pair to the wires, and in this manner it would travel up and down its cage with the utmost address, every now and then thrusting forth its long tongue between the wires, as if in quest of food, which, if offered outside its cage, it would generally endeavour to draw in with this organ. It was very fond of being stroked and gently scratched, and when at play with any one it knew, it would pretend to bite, seizing the hand or fingers with its teeth, as a dog will do when gambolling with its master, but without hurting or intending injury. As the evening came on, its liveliness and restlessness would increase. It was then full of animation, traversing the space allotted to it in every direction, examining every object within its reach, rolling and tumbling about, and swinging to and fro from the wires of the cage: nor was its good-humour abated; it would gambol and play with its keepers, and exhibit in every movement the most surprising energy. In this state of exercise it would pass the night, retiring to rest on the dawn of the morning. The age of this individual is not ascertained; the state of its teeth, however, which are much worn down, shows it to have attained an advanced period; its colour was a pale yellowish gray, inclining to tawny—the hairs, in certain lights, have a glossy appearance. Its dissection after death fully confirmed the propriety of assigning it a place among the plantigrade Carnivora.

The Binturong (*Arctitii Binturong*, Temminck; *Tetides ater*, F. Cuv.) seems to take the place of the kinkajou in the forests of Java and Sumatra. These

animals are prehensile-tailed and arboreal, and resemble the racoons in the principal details of their dentition. They live both on animal and vegetable food, and are particularly fond of plantains; they also eat eggs and birds.



ORDER.—MARSUPIALIA.

MOST zoologists of the present day, and among them the first comparative anatomists, concur in regarding the Marsupial animals (Marsupialia or Marsupiata*) as a distinct group, or sub-class, of the Mammalia. They differ essentially from all others in their organization, yet comprehend genera fed by every variety of nutriment. Some are insectivorous or carnivorous, others herbivorous, and others again frugivorous; some are diurnal, others nocturnal in their habits. Accordingly we find a corresponding modification of the teeth and digestive organs, as well as of those of progression and prehension. Hence may we trace in them analogies to the groups of the ordinary mammiferous quadrupeds, viz., to the Carnivora, the Insectivora, the Rodents, and the Edentata, as was well observed by Cuvier, whose opinions have been abundantly confirmed. It is on physiological grounds that the distinctness of the Marsupials rests: that is, on their structure and economy connected with the reproduction of their species, on the abbreviated term of gestation, and on the immature condition of the young at their birth, which are generally received into the marsupium or pouch, in which nidus the undeveloped being attaches itself to the teats, receives nutriment, and grows, till at length it is capable of acting for itself. In some instances the marsupium is nothing more than a fold of skin, and sometimes it is wanting; but two bones, situated on the anterior part of the pelvis, and termed the marsupial bones, are never absent. These grounds of distinction have been extended by the researches of

* *Marsupium*, a purse or pouch.

anatomists, and among them in particular Professor Owen, who has pointed out several never-failing accordance in the structure of other organs, as the heart and the brain, and also has cleared up many points respecting which doubts had previously existed. Into the series of facts and deductions so luminously treated by that philosophic investigator of nature, the plan of this work forbids us to enter: we refer our readers, however, to the 'Phil. Trans.,' part ii., 1834; the 'Proceed. Zool. Soc. Lond.,' 1831, 1833, 1838, and 1839; 'Phil. Trans.,' part i., 1837; 'Annals of Nat. Hist.,' Nov., 1839; 'Proceed. Geol. Soc. Lond.,' vol. iii., 1838-9, &c.

The Marsupial animals are all restricted to two portions of the globe, namely, America and Australia, including certain islands of the Indian Archipelago. The American species were the first known to European naturalists, and, indeed, the only ones with which Linnæus was acquainted. Captain Cook introduced the kangaroo of Australia to science, and subsequent researches in that region, the newest continent, have made us now familiar with its Fauna and Flora. Upwards of seventy species of Marsupials are known as Australian, besides about eighteen species belonging to other groups of quadrupeds, as the dingo dog, certain seals, a few bats and Rodents. The Marsupial sub-class contains the following families, viz.: 1. *Didelphidæ*. 2. *Dasyuridæ*. 3. *Myrmecobiidæ*. 4. *Peramelidæ*. 5. *Macropidæ*. 6. *Phalangistidæ*. 7. *Phascolomyidæ*. 8. *Monotremata*. Of each of these family sections we shall give examples.

OPOSSUMS.

THE VIRGINIAN OPOSSUM. (*Didelphis Virginiana*.)

The genus *Didelphis*, of which the Virginian opossum is an example, is restricted to America. It contains about twenty species, some of which are very small.

The teeth are as follows:—upper incisors ten, of which the two middle are longer than the rest, and



80.—Teeth of Virginia Opossum.

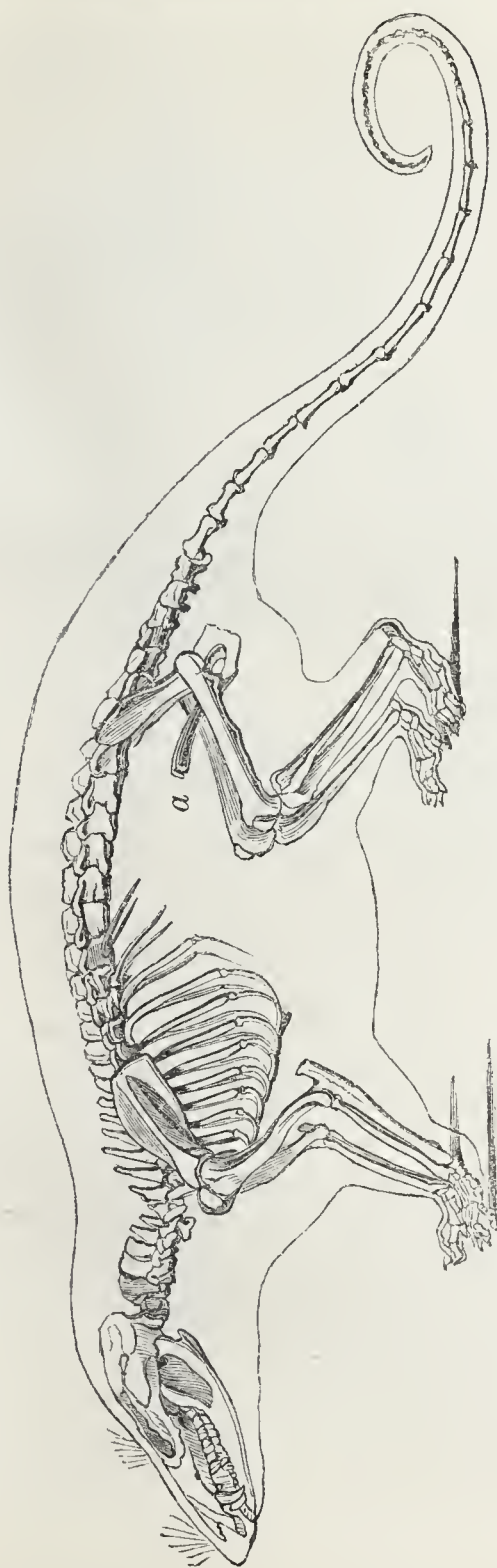
somewhat separated from them ; lower incisors eight ; canines as usual ; molars on each side above, seven, the first three false, triangular, compressed ; molars below, seven, the first three false ; the true molars both above and below crowned with sharp tubercles. Of all terrestrial mammalia, the *Myrmecobius* excepted, the teeth are in these animals the most numerous, amounting to fifty :

$$\text{Incisors } \frac{10}{8} ; \text{ canines } \frac{1-1}{1-1} ; \text{ molars } \frac{7-7}{7-7} = 50. \text{ (Fig. 80.)}$$

The limbs are short, the feet plantigrade, the toes five on each foot, armed with sharp strong curved claws, excepting the inner toe or thumb on the hinder feet, which is opposable, and destitute of a nail. The soles are covered with a naked skin endowed with great sensibility. The tail is scaly and naked, except at its base, and constitutes an organ of prehension, not, however, to the same extent in every species. The head is long and pointed, the profile straight. The eyes are small, dark, prominent, and undefended by eyelids, but furnished with a nictitating membrane. The ears are large, thin, naked, and rounded. The tongue is rough with horny papillæ. The snout is long ; the muzzle pointed, naked, and moist ; the nostrils are lateral ; the mouth extremely wide ; and the expression of the physiognomy peculiar and unpleasant. In one division of this genus the females have a pouch for their young ; in another division the pouch is rudimentary, consisting of a slight fold of skin.

In the figure (81) of the skeleton of the Virginian opossum, the marsupial bones (*a*) are seen.

The Virginian opossum, and its immediate relatives, are slow in their movements, and nocturnal in their habits ; they reside habitually on the branches and in the hollows of trees, remaining torpid during the day. At night they prowl about, and feed upon insects, eggs, birds, reptiles, and small mammalia, adding also fruits and roots to their diet. Their sense of smell is in high perfection. Like our pole-cat, as respects voracity though not activity, they often invade the precincts of the farm-house, destroy poultry and other domestic birds,



81.—Skeleton of Virginian Opossum. *a*, The Marsupial Bones.

and retreat on the first appearance of dawn, leaving their slaughtered victims behind. Their odour is disgusting, especially when alarmed or irritated.

The Virginian opossum is common in many parts of North America, from Mexico to the southern provinces of the United States. It is one of the largest and most robust of the genus, and equals a cat in size, being about twenty-two inches in the length of the head and body measured over the curve of the back; the tail is fifteen inches long. The under fur is deep and woolly, traversed by long straight whitish hairs, often tipped with brown. The ears are large and black, margined at the tip with white. The scaled portion of the tail of a whitish tint. The general colour of the fur is dirty-white, with a slight yellow hue; the legs are dusky-brown, a tint of which surrounds the eyes. Hairs of moustaches long and white, with a few of a black colour intermixed. (Fig. 82.)

There is nothing pleasing either in the appearance or habits of the Virginian opossum: in captivity it is slothful in the extreme, and becomes inordinately fat, eating both animal and vegetable diet. Whatever may be its cunning in a state of liberty, it evinces but little intelligence when caged in our climate, but appears to be a compound of indolence and apathy, not unmixed with timidity. In its native woods it suffers from the attacks of birds and beasts of prey, and is also hunted by man for the sake of the flesh and fat. "As soon as the opossum discovers the approach of his enemies, he lies perfectly close to the branch, or places himself snugly in the angle where two limbs separate from each other. The dogs, however, soon announce the fact of his presence by their baying, and the hunter, ascending the tree, shakes the branch upon which the animal is seated with great violence, so as to alarm and cause him to relax his hold." In this way, driven from branch to branch, he is obliged at last to drop to the ground, where, unless the dogs are vigilant, the animal escapes; for, as is asserted, it steals slowly and quietly to a little distance, and, gathering up itself into a small compass, assumes the



82.—Virginia Opossum.

stillness and attitude of death. This artifice, under the obscurity of night, and amidst dense rank herbage, or tangled underwood, often proves successful. In the 'Perfect Description of Virginia,' 1649, it is noticed as a beast "that hath a bagge under her belly, into which she takes her young ones, if at any time affrighted, and carries them away." Lawson states that "the 'Possum is found nowhere but in America. She is the wonder of all the land animals, being the size of a badger, and near that colour. The female doubtless breeds her young at her teats, for I have seen them stick fast thereto, when they have been no bigger than a small raspberry, and

scemingly inanimate. She has a paunch or false belly, wherein she carries her young, after they are from those teats, till they can shift for themselves. Their food is roots, poultry, or wild fruits. They have no hair on their tails, but a sort of a scale, or hard crust, as the beavers have. If a cat has nine lives, this creature surely has nineteen; for if you break every bone in their skin, and mash their skull, leaving them for dead, you may come an hour after, and they will be gone quite away, or perhaps you may meet them creeping away. They are a very stupid creature, utterly neglecting their safety. They are most like rats of anything. I have, for necessity in the wilderness, eaten of them. Their flesh is very white, and well tasted; but their ugly tails put me out of conceit with that fare. They climb trees as the racoons do. Their fur is not esteemed nor used, save that the Indians spin it into girdles and garters." The prehensile power of the tail serves the animal in more ways than one, for it is stated that the little ones when advanced in growth leap upon their mother's back if they are frightened, and, twisting their tails round hers, escape, with her assistance, the threatened danger.

This animal climbs with great facility, and will hang suspended from the branches by its tail, and by swinging its body contrive to fling itself to the adjoining boughs. It is often observed hanging motionless for a considerable time with its head downwards.

The opossum produces several young, sometimes as many as sixteen at a birth. She makes a thick nest of dry grass, in some obscure retreat, in which to conceal herself. When first born the young are in a most rudimentary state, minute, blind, naked, and shapeless. Yet even in this state they are always found adhering to the teats of the mother, shrouded in her pouch. There they remain until they have attained the size of a mouse, which is not until the fiftieth day, at which period their eyes are opened, and their bodies are covered with hair. They now venture occasionally from their hiding-place, returning to it on the least appearance of danger; nor is

it until they have attained to a considerable size that they finally quit their anxious parent. The period of gestation is said to be twenty-six days.

MERIAN'S OPOSSUM. (*Didelphis dorsigera*.)

Among the opossums, in which a fold of the skin of the abdomen forms only a rudimentary pouch, must be enumerated Merian's Opossum. Though the other opos-



83.—Merian's Opossum.

sums with complete marsupial pouches occasionally carry their young on the back, with their tails twined round that of the parent, still it is in these pouchless species that this curious habit most usually prevails; hence the term *dorsigera*, which, though applied to the present animal, might with equal propriety be given to other species, as *Didelphis brachyura*, *cinerea*, *tricolor*, and *murina*.

Merian's opossum is a native of Surinam, and in its habits it agrees with the rest of the genus. The tail is slender, and longer than the head and body taken together; at the base it is clothed with fur resembling that of the body generally; the naked portion is of a pale brown tint. The fur of this animal is short and lies close; on the upper parts of the body it is grayish brown, the roots of the hairs being paler. The under parts of the body are yellowish white; a deep brown spot encircles the eyes: the forehead, top of the head, cheeks, outer side of the limbs and feet, are yellowish white. Length from nose to root of tail about six inches; length of tail seven inches. A beautiful specimen of this active little opossum, with its young clinging to it, is preserved in the British Museum. (Fig. 83.)

THE YAPOCK. (*Cheironectes palmatus*.)

This interesting animal, the yapock, is a native of Brazil, tenanted the smaller streams and rivers, and it appears to extend from the confines of that empire to the shores of the Gulf of Honduras. Buffon's specimen was procured in Cayenne. He terms it "Petite Loutre de la Guyène." It is also called "Demerara otter."

The yapock measures from ten to fourteen inches long in the head and body, the tail being rather more. The limbs are short, and the contour of the body elongated. The ears are moderate, the nose pointed; the fur of the body close, short, somewhat crisped and glossy; the tail, excepting at the base, is scaly, the scales being spirally arranged and interspersed with fine, short, bristly hairs. The forefeet are divided into five long and slender toes,

armed with small weak claws, the innermost or thumb excepted, which has a flat nail. It is not opposable, though placed rather behind the general line of the other toes. On the outside of the wrist there is an elongated tubercle (the pisiform bone developed) resembling a sixth finger, the use of which is not apparent. The hind feet, which are broad, are each divided into five toes, tied together by ample webs; the claws are small; the inner toe has a flat nail. This curious animal is furnished with cheek-pouches of great size, which extend far back along the sides of the mouth, and this circumstance, as Mr. Ogilby remarks, "hitherto unobserved by



84.—The Yapock.

zoologists, throws considerable light upon the habits of this rare animal, which thus appears, like the ornithorhynchus, to feed upon fresh-water crustacea, the larvæ of insects, the spawn of fishes, &c., which it probably stows away in its capacious cheek-pouches." Small fishes are doubtless among its prey. (Fig. 84.)

The yapock, unlike the opossums, is incapable of climbing: it is an aquatic animal, like the otter, and lives in holes along the banks of the rivers which it frequents, and in which it seeks its food. It is said to take its young early to the water. Two specimens, in the possession of the celebrated naturalist M. Natterer, were caught near water not far distant from Rio Janeiro, and a third was captured alive near Para, in a basket similar to those used in this country for catching eels. It had made its way through the funnel-shaped entrance, under water, and could not return.

The dentition of the yapock differs in some points from that of the opossums: the incisor and canine teeth are the same in both, but the molars are only five on each side, two false and three true, both in the upper and under jaw. The ground colour of the upper surface is dusky black; a white semilunar mark passes from ear to ear across the forehead; on each side are four large transverse marks of delicate gray, one on the scapula, and three on the sides of the body, forming bands interrupted or rendered incomplete by a middle dorsal line. The under surface is white, the tail is black, its tip (the extent varying from half an inch to three or four inches) being white.

THE BRUSH-TAILED PHASCOGALE.

(*Phascogale penicillata*.)

This animal, the "Tapoa tafa" of White, is a native of Australia. It is found throughout the colony of New South Wales, and is common on Liverpool Plains; Mr. Gould saw it also at Adelaide, in South Australia, where it frequently enters the houses. It is arboreal in its habits, and feeds on small birds, insects, &c.; but little is known respecting its general economy.



85.—Brush-tailed Phascogale.

The brush-tailed phascogale belongs to the family of Dasyuridæ. In size it exceeds the common brown rat of our country ; its tail is very bushy, and is probably used to assist in climbing. The fur of the body is long, full, soft and loose ; the general colour above is gray ; the under parts are white. (Fig. 85.)

THE URSINE OPOSSUM. (*Sarcophilus ursinus*, Cuvier.)

In their dental system the animals of this genus (*Sarcophilus*) approach the American opossums ; they differ, however, in having only eight incisors in the upper jaw, and six in the lower. The canines are large ; the false molars are two on each side, above and below : the true

molars four. Dental formula: Incisors $\frac{8}{6}$, canines, $\frac{1-1}{1-1}$,
 molars $\frac{6-6}{6-6} = 42$. (Fig. 86.) All the animals of this
 genus are Australian.

The ursine sarcophilus, or opossum, is a native of Van
 Diemen's Land, and is called by the colonists the *native
 devil*, by which name it was known upwards of thirty



86.—Teeth of the Ursine Opossum.

years back. Instead of being slender and active, as are the *Dasyuri*, this animal is thickset in its proportions and heavy in its movements. Its shape is not unlike that of a badger, but the head is thick, the muzzle short and stout, the eyes small, the mouth wide. (Fig. 87.) The limbs



87.—Head of Ursine Opossum.

are short, robust, and clumsy ; the toes, five on the fore feet, four on the hind, are armed with large claws well adapted for burrowing. The heel is produced, and the sole is naked and callous, indicating a plantigrade step and heavy pace. (Fig. 88.)



88.—Ursine Opossum,

Like the bear, which it resembles in its actions and gait, the ursine opossum sits up on its haunches, and frequently uses its paws in conveying food to the mouth. Its voice is a hollow barking growl. The female produces four or five young at a birth: as in all the Marsupials, they are rudimentary, small, naked, and blind, and in this stage of their existence are found firmly adhering to the teats of the mother.

The ursine opossum measures twenty-one inches in length, exclusive of the tail, which is seven inches. The fur of the body is rather long, harsh, and black; a white gorget is conspicuous on the chest, and a white transverse mark often crosses the haunches. This animal is stupid and voracious in the extreme. Its habits are nocturnal, and it frequents the shore of the sea, feeding upon mollusca, carrion, &c. The flocks of the colonists in Van Diemen's Land, and domestic poultry, suffer from its ravages. During the day it conceals itself in burrows or holes in the ground.

Mr. Harris, who first described this species under the name of *Didelphis ursina*,* says, "These animals were very common on our first settling at Hobart Town, and were particularly destructive to poultry, &c. They however furnished the convicts with a fresh meal, and the taste was said to be not unlike veal. As the settlement increased, and the ground became cleared, they were driven from their haunts near the town to the deeper recesses of the forests yet unexplored. They are however easily procured by setting a trap in the most unfrequented parts of the woods, baited with raw flesh, all kinds of which they eat indiscriminately and voraciously. They also, it is probable, prey on dead fish, blubber, &c., as their tracks are frequently found on the sands of the sea-shore. In a state of confinement, they appear to be untameably savage, biting severely, and uttering at the same time a low yelling growl." We have had frequent opportunities of observing the ursine opossum in captivity. (Fig. 89.) Its heavy head and wide mouth give it a

* It was subsequently ranged under *Dasyurus*, from which it was removed by Cuvier.



89.—Ursine Opossum.

peculiar expression of ferocity unmingled with the slightest intelligence. When roused from its lethargy, it instantly displays its formidable teeth, ready to bite in a moment. It neither acknowledges its keepers nor those who habitually feed it: it keeps in the darkest part of the den, and the nictitating membrane of the eye is in perpetual motion, an indication that light is distressing. It feeds indiscriminately on bread and milk, and flesh. From the strength of its jaws, and the severity of its bite, the ursine opossum is more than a match for an ordinary dog, and, as Mr. Gunn states, is the most destructive animal to sheep in the colony. It is fierce, and defends itself obstinately.

THE DOG-HEADED THYLACINUS.

(Thylacinus Cynocephalus.)

This animal, called zebra opossum, and zebra wolf, tiger, hyæna, &c. is a native of Van Diemen's Land, where it is fortunately much rarer than the ursine opossum, otherwise it would prove a greater pest, from its size and strength. In stature it nearly equals a wolf; the head much resembles that of a dog, but the mouth is wider; the tail is thick at the base, becoming more slender to the point: it is covered with short close hairs of a brown colour. The general fur is short and smooth, of a dusky yellowish brown, barred or zebraed on the lower part of the back and rump with about sixteen black transverse stripes, broadest on the back and gradually tapering downwards, two of which extend a considerable way down the thighs. The ground-colour of the back has a tint of dusky gray. The eyes are large, full, and black. Length of head and body of adult male, nearly four feet; of the tail two feet; average height of back one foot ten or eleven inches. In the specimens we have examined, the tail appeared compressed, as was observed by Mr. Harris, its original describer. Mr. Gunn, however, in the 'Magazine of Natural History,' contradicts this part of Mr. Harris's statement.

Dental formula:—incisors $\frac{8}{6}$; canines $\frac{1-1}{1-1}$; molars $\frac{7-7}{7-7}$, =46.

The toes are 5 on the fore-feet, 4 on the hind-feet; the claws are blunt as in the dog: a narrow naked line runs up the back of the wrist from the ball, and also up the metatarsus of the hind limbs, to half the distance between the ball or pad and the heel. (Fig. 90.)

In its habits the dog-headed thylacinus is nocturnal, remaining concealed during the day in the caverns and fissures of the rocks, in the deep and almost impenetrable glens among the highest mountains of Van Diemen's Land. Like the ursine opossum it is distressed by the light, and



90.—Dog-headed Thylacinus.

brings the nictitating membrane of the eyes into perpetual use. During the night it prowls, hyæna-like, in quest of prey. The bush kangaroo and other animals it destroys, and even manages to eat the spine-covered echidna (or porcupine anteater), which is so protected by its panoply of spears as to seem almost invulnerable. An individual was caught by Mr. Harris in a trap baited with kangaroo flesh; it lived but a few hours, having received some internal hurt in securing it, and appeared to be stupid, inactive, and ferocious, uttering from time to time a short guttural cry; like the owl, it was constantly drawing and undrawing the nictitating membrane

of the eye. In its stomach was found the partly-digested remains of a porcupine anteater. Mr. Gunn (see 'Annals of Natural History' for 1838, vol. i., p. 101) informs us the thylacinus is common in the more remote parts of the colony, and is often caught at Woolnorth and Hampshire Hills. It usually attacks sheep in the night, but is also seen during the daytime, upon which occasions, perhaps from its imperfect vision by day, its pace is very slow. We are not aware that this animal has ever been brought alive to Europe.

THE LONG-NOSED BANDICOOT. (*Perameles nasuta*.)

The Bandicoots appear to take in Australia the place of the shrews, tenrecs, and other Insectivora in the Old World. Closely allied in the structure of their organs of locomotion to the kangaroos, yet in their system of dentition they exhibit a remarkable difference. In this latter point they in some respects approach the opossums (*Didelphis*), and the characters of the teeth indicate an insectivorous appetite. Above, the incisors are 10 in number; of these the outermost on each side is conical and apart from the rest. The canines are curved and stand isolated; the molars on each side are 7, of which the 3 first are false, compressed, and sharp. The four true molars are crowned with sharp tubercles. Below the incisors are 6 in close array, and projecting obliquely. The canines and molars are as in the upper jaw.

Dental formula:—incisors $\frac{10}{6}$; canines $\frac{1-1}{1-1}$; molars

$$\frac{7-7}{7-7}, = 48. \quad (\text{Fig. 91.})$$

The general contour and form of the bandicoots is rabbit-like, but the muzzle is elongated, narrow, and pointed, the nose advancing considerably beyond the jaw. The fore-feet are divided into five toes: of these the innermost is rudimentary, and the outermost a mere tubercle, having a minute nail. The three middle toes are large, and armed with strong claws. The hinder



91.—Teeth of Long-nosed Bandicoot.

limbs, though not developed to the same proportionate extent as in the kangaroos, exceed the fore-limbs. The metatarsus is elongated and naked beneath; the toes are four in number, viz., on the inner side, two toes joined in common integument, as in the kangaroos, each furnished with its distinct claw; a large and robust middle toe, with a straight strong pointed claw; and a small outer toe also armed with a straight claw. (Figs. 92, 93.)



92.—Long-nosed Bandicoot.

Though the system of dentition in the bandicoots is insectivorous, they do not refuse vegetable aliment; they live in burrows, for the digging of which their fore-paws are well adapted. In their movements these animals resemble a rabbit; they do not, like the kangaroo, bound from the hind limbs alone, but, arching the back, proceed with a saltigrade gait, that is half way between running and jumping; or rather by a succession of short leaps from the hind to the fore feet, but not with much speed, nor maintained for a great length of time. The kangaroos make considerable use of the tail, but in the bandicoots it is by no means so important an organ, though it assists them in sitting upright, an attitude usually assumed when eating, the fore-paws being brought into use as holders, like those of the squirrel. With these paws they scratch up the earth in search of roots and insects, and it is said that the potato

crops of the colonists in some districts suffer from their incursions. They are readily tamed, and in a few days become reconciled and familiar. Five species are now known: of these one is a native of New Guinea. The long-nosed bandicoot is found in New South Wales. It measures about 16 inches in the length of the head and body, and 5 in that of the tail. The ears are erect, pointed, and covered with short hair; the eyes are very small; the nose remarkably long, pointed and naked at the extremity. The tail is slender, and though better covered with hair bears some resemblance to that of a large rat. The hair is of two kinds, an upper and under coat; the hairs forming the upper or external coat are coarse and harsh. In colour it resembles the rat, except-



93.—Long-nosed Bandicoot.

ing that it is of a more sandy shade on the upper parts of the body, and of a more clear silvery white beneath. The under-coat, concealed by this outer garment, consists of soft ash-coloured wool or fur, well calculated to protect the animal from cold and variations of temperature; for it appears to be an inhabitant of the mountain districts of Australia, principally, if not exclusively.

The form and characters of its teeth would lead us to suppose that it fed almost entirely upon insects and similar creatures; and M. Geoffroy even imagines that it may use its long snout for the purpose of rooting up the earth like a pig in search of worms and grubs. The colonists however assert that these bandicoots are chiefly if not purely herbivorous, and that the principal part of their food consists of roots, which they dig up with their sharp and powerful claws. In the neighbourhood of human habitations they frequently enter into the granaries, and do as much mischief to the corn as the rats and mice of our own country. The Australians have however one advantage over the European farmers in this respect: the bandicoot is more easily excluded than the rat, for it cannot, like that destructive species of vermin, eat its way through the planks and timbers, and still less through the brick walls of buildings. It is probably from this habit of committing petty depredations upon the farm-yards and granaries, as well as from the general similarity of their external appearance, that the colonists of New South Wales sometimes confound the bandicoots with various species of murine animals originally found in the country under the common denomination of native rats and mice. Nor is it at all improbable, notwithstanding the assertion of the colonists to the contrary, that M. Geoffroy's conjecture as to the insectivorous habits of this animal may be at least partly if not entirely true. The common rat, with teeth much less adapted for living upon flesh than those of the bandicoots, is well known to have decidedly carnivorous propensities: and, as M. Geoffroy very correctly observes, it is seldom that analogous forms of dentition fail to indicate analogous appetites.

The insectivorous hedgehog eats the root of the plantain, boring with its snout under the plant so as to get fairly at it, leaving the leaves untouched.

THE CHÆROPUS. (*Chæropus Castanotis*, Gray.)

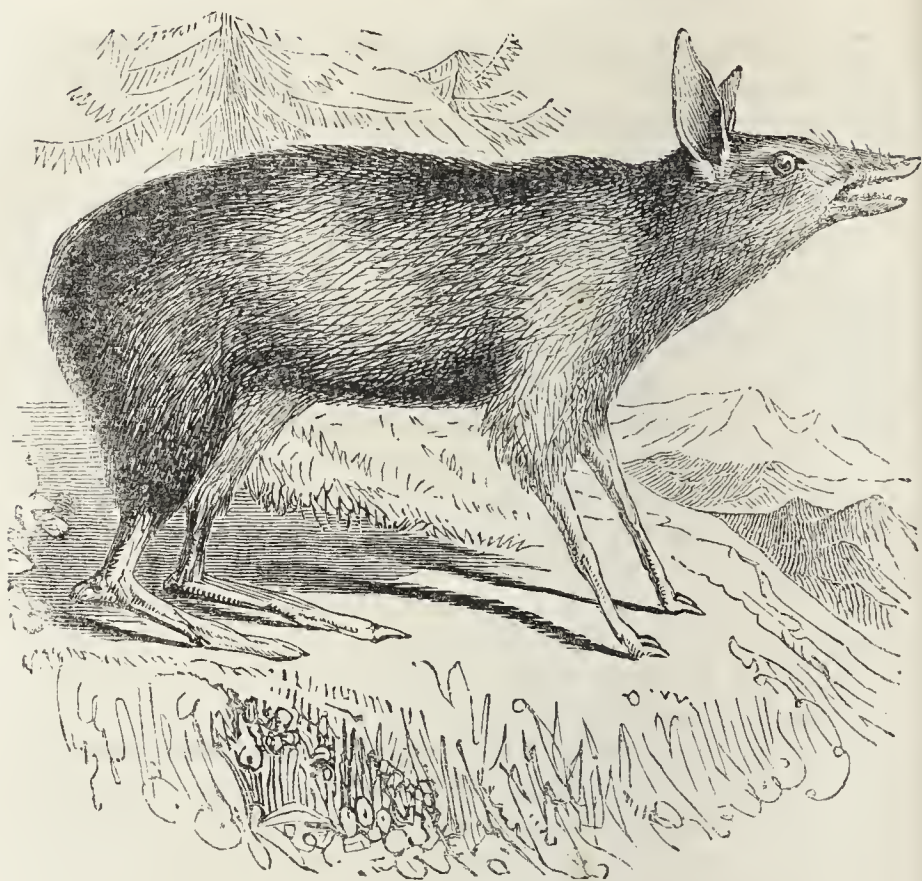
This animal, which is closely allied to the bandicoots, was first described by Mr. Ogilby (March, 1838) from a drawing made by Sir Thomas Mitchell. The animal was found by that officer on the banks of the river Murray during his expedition into the interior of New South Wales. The following is from his journal :—

“ June 16, 1836. The most remarkable incident of this day’s journey was the discovery of an animal of which I had seen only a head in a fossil state in the limestone caves of Wellington Valley, where, from its very singular form, I supposed it to belong to some extinct species. The chief peculiarity then observed was the broad head and very long slender snout, which resembled the narrow neck of a wide bottle ; but in the living animal the absence of a tail was still more remarkable.* The feet, and especially the fore-legs, were also singularly formed, the latter resembling those of a pig ; and the marsupial opening was downwards, and not upwards, as in the kangaroo and others of that class of animals. This quadruped was discovered by the natives on the ground, but on being chased it sought refuge in a hollow tree, from which they took it alive, all of them declaring that they had never before seen an animal of the kind. This was where the party had commenced the journey up the left bank of the Murray, immediately after crossing that river.”

The specimen was presented to the Museum at Sydney. (Fig. 94.)

The drawing of the fore-foot very closely resembles that of the pig : two toes are represented short and of

* It has however been since ascertained that the animal has a tail nearly as long as that of the bandicoot. It was at first named *ecaudatus*, but in consequence of this fact having been ascertained the name was changed.



94.—Chæropus.

equal length, with hoof-like claws; but there is a swelling at the base of the first phalanges, which renders it probable that there may be two rudimentary ones also present. The form and characters of the hind-feet are perfectly similar to those of *Perameles*, as are also the teeth, as far as Mr. Ogilby could judge from the drawing, except that the canines appeared much smaller. The ears are long, elliptical, and nearly naked; the head broad; the muzzle long and pointed; the body is described as being about the size of that of a small rabbit, and the fur much of the same colour and quality as in that animal. (See 'Proceed. Zool. Soc. Lond.,' March, 1838.) Most probably, in its habits and manners, the animal resembles the bandicoots, but we must wait for definite information before we can speak positively.

THE BANDED MYRMECOBIUS. (*Myrmecobius fasciatus*.)

This elegant little creature is the example of a new genus recently described by Mr. Waterhouse. It is thus characterized:—Fore-feet with five toes, hind-feet with four toes, all free; head elongated, snout produced; ears moderate, subacute; body slender; tail rather long.

Dental formula:—incisors, $\frac{8}{6}$; canines, $\frac{1-1}{1-1}$; false molars, $\frac{4-4}{5-5}$; true molars, $\frac{4-4}{4-4}$; = 52. The teeth are minute and insectivorous in their character; and the branch of the lower jaw (see Fig. 95) is twisted in such a manner, that the outer surfaces of the true molars come in contact with the masticating surface of those of the upper jaw. The toes are armed with strong curved claws.



95.—Skull and Lower Jaw of Banded Myrmecobius.

The Banded Myrmecobius is about the size of a squirrel. The fore part of the body is reddish, gradually blended into the black, which is the prevailing colour of the posterior half, and which is adorned with nine white bands. Fur of two kinds. Under hair scanty and whitish gray; upper hair rather coarse, short, and adpressed on the anterior parts; long on the posterior and under parts;

hairs on the anterior part of the back generally black at the base and fulvous at the apex ; those on the head very short, brownish above, being composed of a mixture of black, fulvous, and a few white hairs ; a few black hairs spring from the sides of the muzzle and under each eye ;



96.—Banded Myrmecobius.

hair of the tail long and rather bushy ; most of the hairs on the under part fulvous at the base and white at the tip ; those on the under side of the tail generally black at the base and white at the apex. Length from nose to root of tail, ten inches ; length of tail to the end of the hair, seven inches. (Fig. 96.)

It is a native of the district bordering the Swan River.

“ This beautiful and interesting little animal,” observes Mr. Waterhouse, “ was first discovered by Lieut. Dale whilst on an exploring party in the interior of the country at the Swan River settlement, and was discovered about 90 miles to the south-east of that river. Two of these animals, says Lieut. Dale, were seen within a few miles of each other ; they were first observed on the ground, and, on being pursued, both directed their flight to some hollow trees which were near. We succeeded in capturing one of them ; the other was unfortunately

burnt to death in our endeavour to dislodge it by fumigating the hollow-tree in which it had taken refuge. The country in which they were found abounded in decayed trees and ant-hills. A second specimen has since been brought to England and placed in my hands for examination. I was informed this was brought from Van Diemen's Land, but Mr. Alexander Gordon, who had sent the specimen to England to be stuffed, has since assured me that I was misinformed, he having himself procured the animal at Swan River."

THE GREAT KANGAROO.

(*Macropus major*, and *M. Giganteus*, Shaw.)

The general aspect of the kangaroos is very peculiar; the anterior parts of the body are light and flexible, and the fore limbs are small. In contrast with these characters is the vast development of the hinder quarters, the haunch, hind limbs, and tail—parts of the frame in which the muscular power of the animals is concentrated.

The hinder limbs are voluminous and long: the metatarsus is produced, and furnished beneath with a naked callous pad, running from the toes to the heel. The ordinary attitude of the kangaroos is upright, with a forward inclination, the weight resting on the hind limbs, the long sole (or metatarsus) of which is applied to the ground, and also on the tail, which with the limbs forms a tripod for the support of the body. The chest is contracted, the body tapering from the haunches to the neck, the contour being pyramidal. The head is well proportioned and delicately turned. The fore-paws have 5 toes armed with strong sharp claws; the hind feet are divided into four toes; of which the two innermost are very small, and compacted together so as to appear as one; but the slender bones of each and the claws are distinct. The third or middle toe is large and powerful, well padded beneath, and armed with a strong hoof-like nail. The outer toe is less than the middle, but larger than the two inner toes together; its nail is in proportion. The



97.—Skeleton of the Kangaroo.

eyes are full ; the ears rather large ; the upper lip is cleft. There are perfect clavicles, and the arm enjoys considerable freedom of motion.

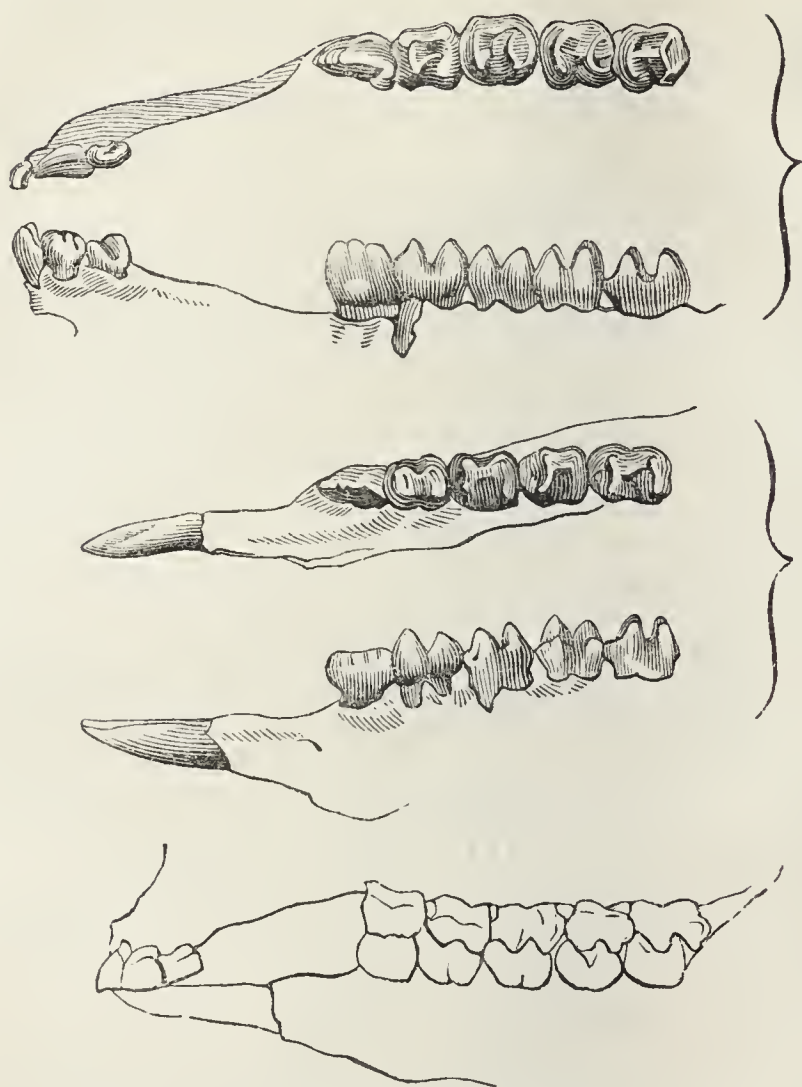
The skeleton of the Great Kangaroo (Fig. 97) well displays the difference in the development of the limbs, and the solidity of the osseous structure of the tail, which is clothed with voluminous muscles.

The dentition in the genus *Macropus* is as follows :—The incisors of the upper jaw are 6 in number ; the lateral one on each side being the largest and furrowed. Between the incisors and the molars there exists a large unfilled space. The molars are five on each side, but the first is a false molar, and often wanting, being pushed out by the advance of those behind as the posterior ones rise from their sockets. In the under jaw the incisors are 2, long, powerful, and pointed ; they advance horizontally forwards, and have a sharp oblique external edge opposed to the edge of the upper incisors.

The molars as in the upper jaw, and also rough, with two transverse sharp prominences, which wear gradually down, showing a fold of enamel encircling an osseous centre. Fred. Cuvier divided from the genus *Macropus* those kangaroos which had shorter ears, and a nearly naked tail, though their dentition is the same. He placed them in a genus which he termed *Halmaturus*.

Dental formula :—incisors, $\frac{6}{2}$; canines, $\frac{0-0}{0-0}$; molars, $\frac{5-5}{5-5}=28$. (Fig. 98.)

The ordinary mode of progression in these animals, as well as their flight from enemies, is by a series of bounds, often of prodigious extent. They spring from their hind limbs alone, neither the tail nor the fore limbs being in requisition. In feeding they assume a crouching hare-like position, resting on the fore paws as well as on the hinder extremities while they browse on the herbage. In this attitude they hop gently along, the tail being pressed to the ground. On the least alarm, however, they rise on their hind limbs and bound to a distance



98.—Teeth of Great Kangaroo.

with great rapidity. Sometimes, when excited, the old male of the Great Kangaroo stands on tiptoe and on his tail, and is then of prodigious height. In fighting he balances himself for a moment on the tail, and strikes forward with both the hind legs, using his fore paws at the same time. The blows given by the hind feet are terribly effective.

The diet of the kangaroo is exclusively herbaceous ; the stomach is very large and sacculated, and balls of hair, similar to those so often occurring in the stomach of cows and oxen, have in a few instances been found in it. These balls, as was observed by Mr. Owen, are entirely composed of the hairs of the animal matted together, and agglutinated by the mucus of the stomach. With the complexity of the stomach of the kangaroos is associated the act of rumination. The kangaroo ruminates while in its erect attitude ; but this act by no means takes place with the same frequency and regularity as in the true ruminants, viz. the ox or deer.

The Great Kangaroo (the Boomer, Forester, and Old Man Kangaroo of the colonists ; Bundaary of the aborigines) is extensively spread in New Holland, in the intermediate country between New South Wales and South Australia, and also in Van Diemen's Land. It was first discovered by the celebrated navigator Captain Cook in 1770, while stationed on the coast of New South Wales.

The Great Kangaroo is not strictly speaking gregarious ; more than six or eight are seldom seen together ; most frequently it is met with singly or in pairs. (Fig. 99.) The kind of country which it prefers consists of low grassy hills and plains skirted by thin open forests of brushwood, to which Mr. Gould says it resorts for shelter from the oppressive heat of the mid-day sun. That it would bear, if naturalized, the severities of our winter, is beyond a doubt, since in Van Diemen's Land, among other places, it resorts to the bleak, wet, and frequently snow-capped summit of Mount Wellington.

The male greatly exceeds the female in size, measuring 7 feet 10 inches from the nose to the extremity of the tail, the length of the latter being little more than 3 feet. Instances have occurred of the weight being 220 pounds. The general colour is uniform grayish-brown, grizzled on the arm and under surface. A whitish mark runs above the upper lip, and is faintly traceable along the sides of the face. The hands, feet, and tip of the tail are black.

The kangaroo readily takes to the water, and swims



99.—Great Kangaroos.

well. It often resorts to this mode of escaping from enemies, among which is the dingo, or Australian dog. Man, however, is the most unrelenting foe of this inoffensive animal. The native employs several modes of obtaining it. Sometimes he steals upon it, under the covert of the trees and bushes, till within range of his unerring spear. Sometimes numbers of men unite in a large party, and, forming a circle, gradually close in upon the animals with shouts and yells, by which the animals are so terrified and confused, that they easily become victims to the bommerengs, clubs, and spears which are directed from all sides against them. The colonist

employs the gun, and a breed of dogs between the greyhound and bulldog, fierce, powerful, and very fleet, for the course. Many of these dogs, says Mr. Gould, are kept at the stock-stations of the interior for the sole purpose of running the kangaroo and the emu. The latter is killed solely for the supply of oil which it yields, and the former for mere sport, or for food for the dogs. "Although," he adds, "I have killed the largest males with a single dog, it is not advisable to attempt this, as they possess great power, and frequently rip up the dogs, and sometimes cut them to the heart with a single stroke of the hind leg. Three or four dogs are generally laid on, one of superior fleetness to *pull* the kangaroo, while the others rush in upon and kill it. It sometimes adopts a singular mode of defending itself by clasping its short but powerful arms around its antagonist, leaping away with it to the nearest water-hole, and there keeping it beneath the surface until drowned. With dogs the old males will do this whenever they have an opportunity, and it is also said they will attempt the same with man."

In Van Diemen's Land the Great Kangaroo is regularly hunted with foxhounds, as the deer or fox in England. The sport is said to be excellent. Mr. Gregson says, in a letter to Mr. Gould, "I recollect one day in particular when a very fine boomer jumped up in the very middle of the hounds, in the *open*. He at first took a few high jumps with his head up, and then, without a moment's hesitation, he stooped forward, and shot away from the hounds apparently without effort, and gave us the longest run I ever saw after a kangaroo. He ran fourteen miles by the map, from point to point, and, if he had had fair play, I have little doubt that he would have beat us. But he had taken along a tongue of land that ran into the sea, so that, on being hard pressed, he was forced to try to swim across the arm of the sea, which cannot have been less than two miles broad. In spite of a fresh breeze and a head-sea against him, he got fully half-way over; but he could not make head against the waves any farther, and was obliged to turn back, when, being quite exhausted, he was soon killed. The distance he ran,

taking the different bends of the line, was not less than eighteen miles." He was far before the hounds and quite fresh when he took to the water. His hind quarters weighed nearly seventy pounds. "We did not measure the distance of the hop of this kangaroo, but on another occasion, in which the boomer had taken along the beach, and left his prints in the sand, the length of each jump was found to be fifteen feet, and as regular as if they had been stepped by a sergeant. When a boomer is pressed, he is very apt to take to the water, and then it requires several good dogs to kill him; for he stands waiting for them, and, as they swim up to the attack, he takes hold of them with his fore feet, and holds them under water. The buck is very bold, and will generally make a stout resistance; for, if he cannot get to the water, he will place his back against a tree, so that he cannot be attacked from behind, and then the best dog will find him a formidable antagonist. The doe, on the contrary, is a very timid creature; and I have even seen one die of fear." (Fig. 100.)

The period of gestation in the kangaroo is thirty-nine days. The appearances presented by the young one twelve hours after birth, and adhering to the teat of the mother, within the pouch, are thus described by Mr. Owen:—"It resembled an earthworm in the colour and semi-transparency of its integument, adhered firmly to the point of the nipple, breathed strongly but slowly, and moved its fore legs when disturbed. Its body was bent upon the abdomen, its short tail tucked in between the hind legs, which were one-third shorter than the fore legs, but with the three divisions of the toes now distinct. The whole length from the nose to the end of the tail when stretched out did not exceed one inch and two lines." (Fig. 101.)

Though enabled by means of its lips to grasp the nipple with considerable firmness, the unaided efforts of the young one could not draw nutriment thence, and consequently the mammary gland is acted upon by a peculiar muscle, which, compressing it, forces out the milk into the mouth of the young. Mr. Owen remarks

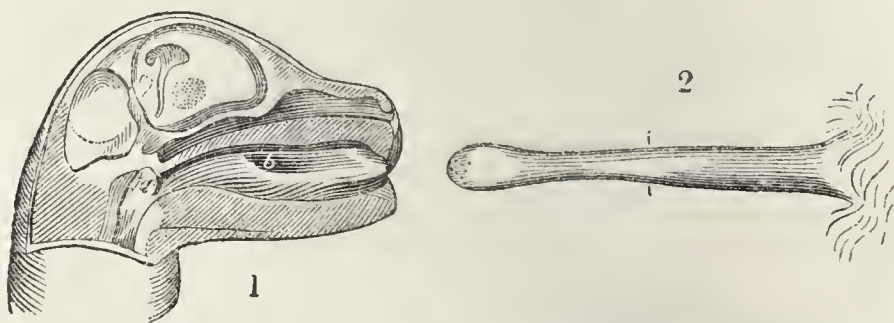


100.—Great Kangaroo.

that it can scarcely be supposed that the efforts of suction should always be coincident with the successive jets of milk, and that there might arise danger from the flow of milk into the little creature's larynx. To remedy this



101.—Outline of the Kangaroo about twelve hours after birth, showing its natural size and external development at this period. *a*, the upper nipple of the left side, to which it was attached; *b*, the lower nipple of the same side.



102.—1. Dissected Head of mammary foetus of a Kangaroo. 2, Teat of the mother; the mark shows how far it is taken in by the young.

there is a special contrivance, first described by Geoffroy, but which was not unnoticed by Hunter, as evidenced by preparations of the larynx and throat of two young kangaroos in the museum of the Royal College of Surgeons. (Fig. 102.)

“Thus aided and protected by modifications of structure,” continues Professor Owen, “both in the system of the mother and in its own, designed with

especial reference to each other's peculiar condition, and affording, therefore, the most irrefragable evidence of creative foresight, the feeble offspring continues to increase from sustenance exclusively derived from the mother for a period of about eight months. The young kangaroo may then be seen frequently to protrude its head from the mouth of the pouch, and to crop the grass at the same time that the mother is browsing. Having thus acquired additional strength, it quits the pouch, and hops at first with a feeble and vacillating gait, but continues to return to the pouch for occasional shelter and supplies of food till it has attained the weight of ten pounds. After this it will occasionally insert its head for the purpose of sucking, notwithstanding another foetus may have been deposited in the pouch, for the latter, as we have seen, attaches itself to a different nipple from the one which had been previously in use."

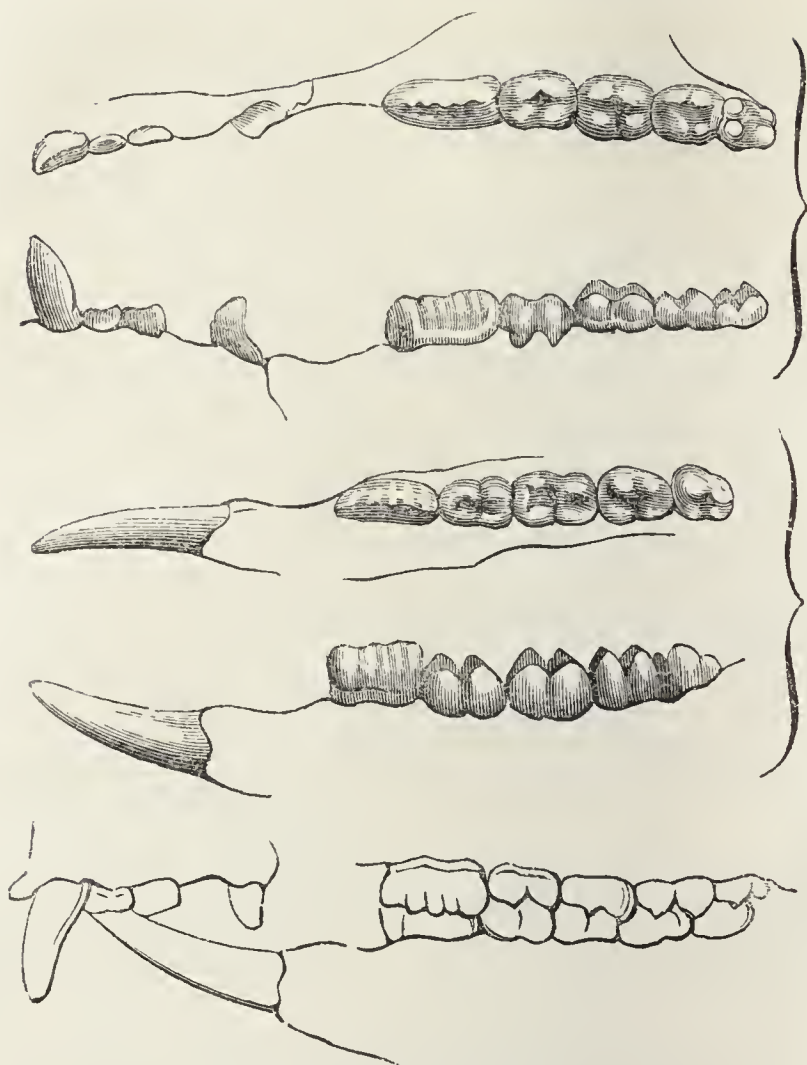
THE KANGAROO RAT, OR POTOROO

(*Hypsiprymnus murinus*, Pander and D'Alton). The Bet-tong of the natives of New South Wales.

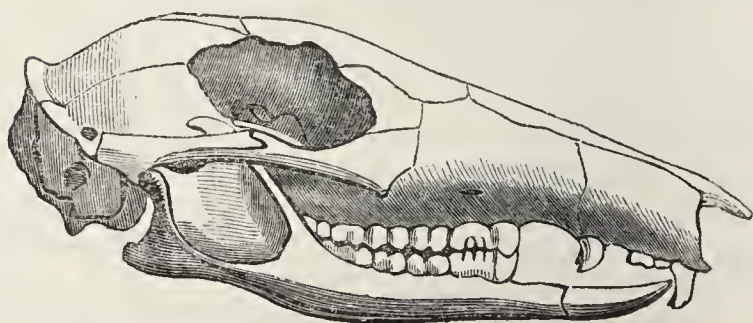
It is principally in their dentition, and in the elongated narrow form of the head, that the little animals of the genus *Hypsiprymnus* differ from the kangaroos. There are canines in the upper jaw. The dental formula is as

follows (Fig. 103):—incisors, $\frac{6}{2}$; canines, $\frac{1-1}{0-0}$; molars, $\frac{5-5}{5-5} = 30$. Fig. 104 represents the skull, the elongated contour of which is very conspicuous.

The Potoroo (the *Macropus minor* of Shaw; *H. setosus* of Ogilby; *H. Peronii*, Quoy and Gaimard) is about the size of a rabbit, measuring fifteen inches from the nose to the root of the tail, the latter being ten inches and a half in length. The general colour of the fur is brown; on the back blackish, peneilled with brownish-white. Lips, chin, throat, and under parts of



103.—Teeth of Kangaroo Rat.



104.—Skull of Kangaroo Rat.

the body dirty-white ; fore feet brown ; ears rounded, and well covered with hair ; tail scaled, and sparingly clothed with short decumbent hairs, which (excepting at the base and extreme point) are of a black colour on the upper part and sides of the tail. The hairs on the under side are brown ; and at the tip there are a few dirty-white hairs. (Fig. 105.)



105.—Kangaroo Rat.

The Potoroo is common in New South Wales. It is timid and inoffensive, feeding on vegetables, and proceeding in the manner of the kangaroo. Of its habits little is known. It frequents the precincts of scrubs and patches of brushwood, and scratches up the ground in quest of roots. These animals are found to be very destructive to the potato-crops, and are very readily caught by baiting traps with this vegetable.

Several other species have been described.

THE SOOTY TAPOA (*Phalangista fuliginosa*).

This animal presents us with the example of a group termed Phalangers (genus *Phalangista*); but they are often, but erroneously, called opossums in the writings of travellers and persons not conversant with natural history.

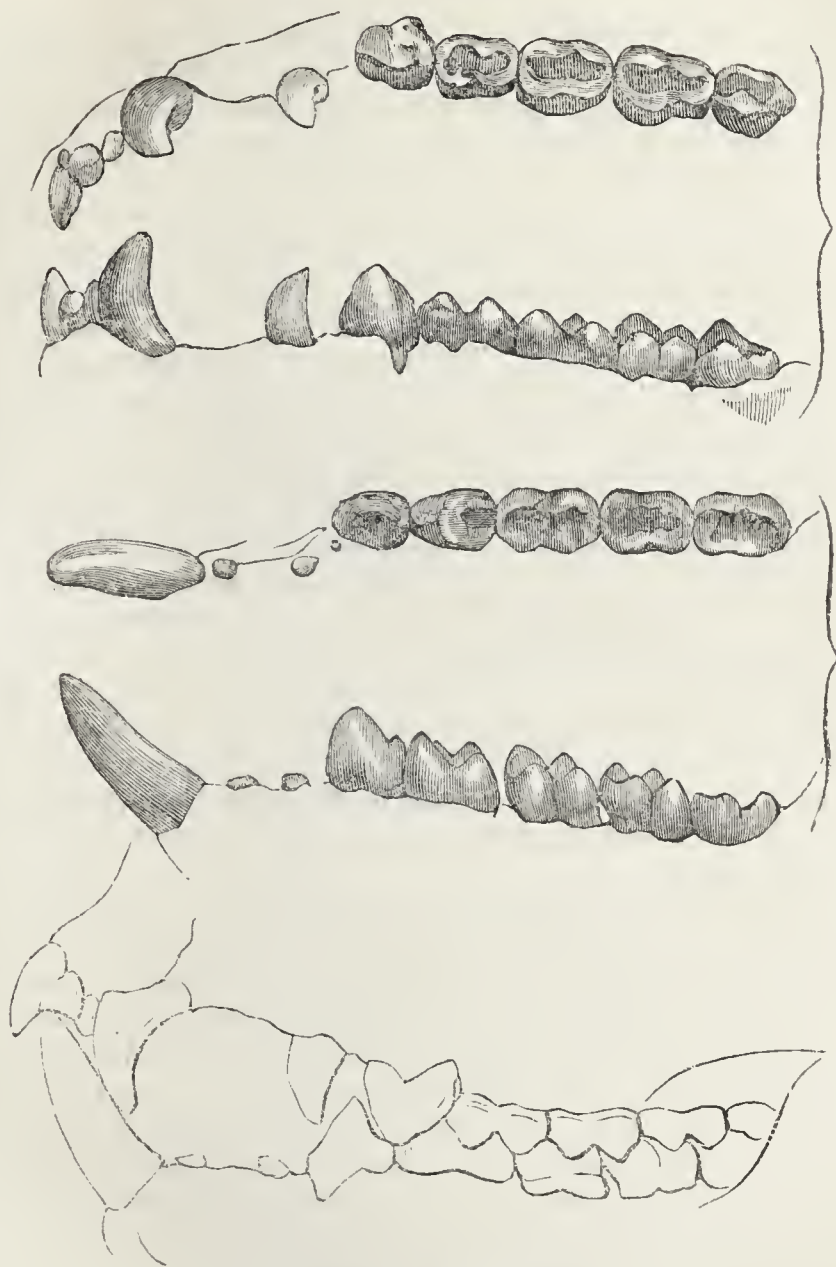
The Phalangers of Australia have six incisors above, of which the two middle are the largest; and in the lower jaw are two long obliquely projecting incisors, which are met by the corresponding incisors of each side. There is a small canine on each side in the upper jaw only. The molars on each side, above and below, are five, of which the first is a false molar. These are the constant teeth, but besides there are in some species little additional molars, sometimes canine-like molars, in front of the contiguous and constant series. The number of these additional teeth varies in the same individual on

different sides of the jaw. Dental formula :—incisors, $\frac{6}{2}$;

canines, $\frac{1-1}{0-0}$; molars, $\frac{5-5}{5-5}$; additional inconstant

molars, $\frac{1-1}{2-2}$, or $\frac{2-2}{3-3}$, or $\frac{1-1}{1-1}$, or $\frac{3-3}{2-2}$. (Fig. 106.)

The head is somewhat elongated, the forehead slightly arched, the mouth moderate. The feet have five toes; those of the fore feet are armed with strong hooked claws; those of the hind feet consist of four true toes, and a large thumb destitute of a nail, and very distinct from the rest, of which the two innermost are shorter than the two outermost, and are united together to the base of the claws. The tail is long and prehensile, well furred, excepting at the extreme point and part of the apical portion beneath, which is bare to a greater or less extent. We may here observe that the Phalangers form three sections or subgenera. The first (*Phalangista*) is exclusively Australian, and has the tail naked beneath only at the tip. The second section comprehends a group



106.—Teeth of Sooty Tapoa.

(*Cuscus*) distinguished by having the tail throughout the greater part of its extent beneath naked, scaly, and highly prehensile. The ears are short and close. These animals inhabit the Celebes and Moluccas, where they are called

Couscous, or Coëskoës. The third group (*Pseudocheirus*, Ogilby) has the tail less densely clothed than in Phalangista proper: the apical portion is naked beneath; the fore feet, with the two united inner toes, slightly opposed to the others.

Besides these are the Flying Phalangers, constituting a distinct genus, *Petaurus*. The true Phalangers, of which we figure the Vulpine Phalanger (*Ph. vulpina*), are animals of arboreal habits, residing almost constantly among the branches. Their food consists principally of fruits, buds, leaves, &c., but insects, eggs, &c., are also eaten. Night is their season of activity; during the day they conceal themselves in the hollows of trees, or lie close on the branches, hidden by the foliage. The number of young which the females produce at a birth appears to be two, at least if the account of Mr. Bennett (see 'Wanderings in New South Wales') is to be taken as a criterion. He states that on one occasion he was present when a number of flying squirrels (viz. flying phalangers), opossums (phalangers), bandicoots, snakes, &c., were caught by the natives during what he terms a hunting expedition, and that one of the opossums among the game was a female, and had two large-sized young ones in her pouch.

Though the Phalangers are at ease among the branches, the motions of these animals, generally speaking, are not distinguished by that nimbleness and rapidity which we so much admire in the squirrel. On the contrary, their motions are slow and cautious, and they use their prehensile tail as an additional security. When in danger of discovery, they are said to suspend themselves by the tail, hanging, head downwards, motionless as if dead; and this is more remarkably the case with the Couscous of the Moluccas. It is, indeed, reported that, if a man fix his eyes on one thus counterfeiting death, it will continue to hang till, no longer able to sustain the weight, the muscles of the tail relax with extreme fatigue, and the animal falls to the ground. Few animals have more soft and delicately woolly fur than the Phalangers: their skins are consequently highly prized by the abori-

gines, as well as their flesh, which is eaten with avidity, and doubtless is not inferior to that of the kangaroo.

Like many of the Marsupials, the Phalangers have an unpleasant smell, owing to a fluid secreted in certain glands ; but this does not affect the delicacy and flavour of the flesh.

In captivity the Phalangers are not very attractive : during the day they slumber concealed among the hay or other bedding of their cage, shrouding themselves from observation, and are impatient of interruption ; they do not, however, attempt to bite, and appear as stupid as they are sluggish : their form, however, is graceful, and their fur sets them off to much advantage. When feeding they sit up like the squirrel, holding the article of which they are partaking between the fore paws. During the night they traverse their cage, take their food, and enjoy the active hours of their existence. We know of no instance in which they have bred in Europe ; but as the kangaroo produces young in our climate, it is not improbable that under favourable circumstances these animals also might multiply in our extensive menageries, especially as they appear to bear our climate very well, care being taken against their exposure to the severities of the weather.

The following description of the Sooty Tapoa was taken from a living specimen :—" The shape and proportions of *Phalangista fuliginosa* are those of the *Phal. vulpina* : the ears are also of similar shape and size, hairy on the outsides, but naked within. The colour is a uniform sooty-brown over all parts of the head and body, not even excepting the belly and the inner surface of the thighs. The hair has a frizzled appearance, but it is not so close nor so fine as in *Phal. vulpina*. The tail is long, black, and rather bushy ; the naked slip underneath, as well as the nose and soles of the feet, which are also naked, is of a bright flesh-colour. The moustaches are large, stiff, and black." The individual was said to have been brought from Sydney. In the museum of the Zoological Society are seven or eight distinct species of this genus.



107.—Vulpine Phalanger.

THE VULPINE PHALANGER (*Phalangista vulpina*).

Of all the species the Vulpine Phalanger is probably the most carnivorous. The female is destitute of a true pouch, and the teats are two in number. The Vulpine Phalanger is about the size of a cat; in captivity it displays but little to interest ordinary observers, the day being passed in sleep; nor, when roused up by the approach of night, is it remarkable for activity or alertness. Its fur is soft, fine, and woolly; the predominating tint is grayish-brown, passing into a yellowish-gray on the shoulders; the tail is covered with long black fur, excepting along a line on the under side at the tip, which is naked. It is a native of New South Wales, and also

of Van Diemen's Land, where it is common. The tint of colouring is subject to considerable variation as respects intensity, intermediate shades being observable between the ordinary gray specimens and the Sooty Tapoa, which is regarded as a distinct species. The native name of the Vulpine Phalanger, according to White, is *Wha tapoa roo*.

THE SPOTTED COUSCOUS

(*Cuscus maculatus*. *Cuscus amboinensis*, Lacép.; *Phalangerista maculata*, Geoffr.).

This species is a native of the islands of Amboina and New Guinea, where it is called Couscous or Coëskoës.



108.—Spotted Couscous.

M. Lesson found it at Waigiou, where it is called Scham-scham. It is arboreal, and its flesh is in request, being esteemed as delicate food by the natives. In colouring this animal is subject to much variation; generally the ground-tint is whitish, ornamented with isolated brown spots; these sometimes blend or run into each other. The fur is thick and woolly.

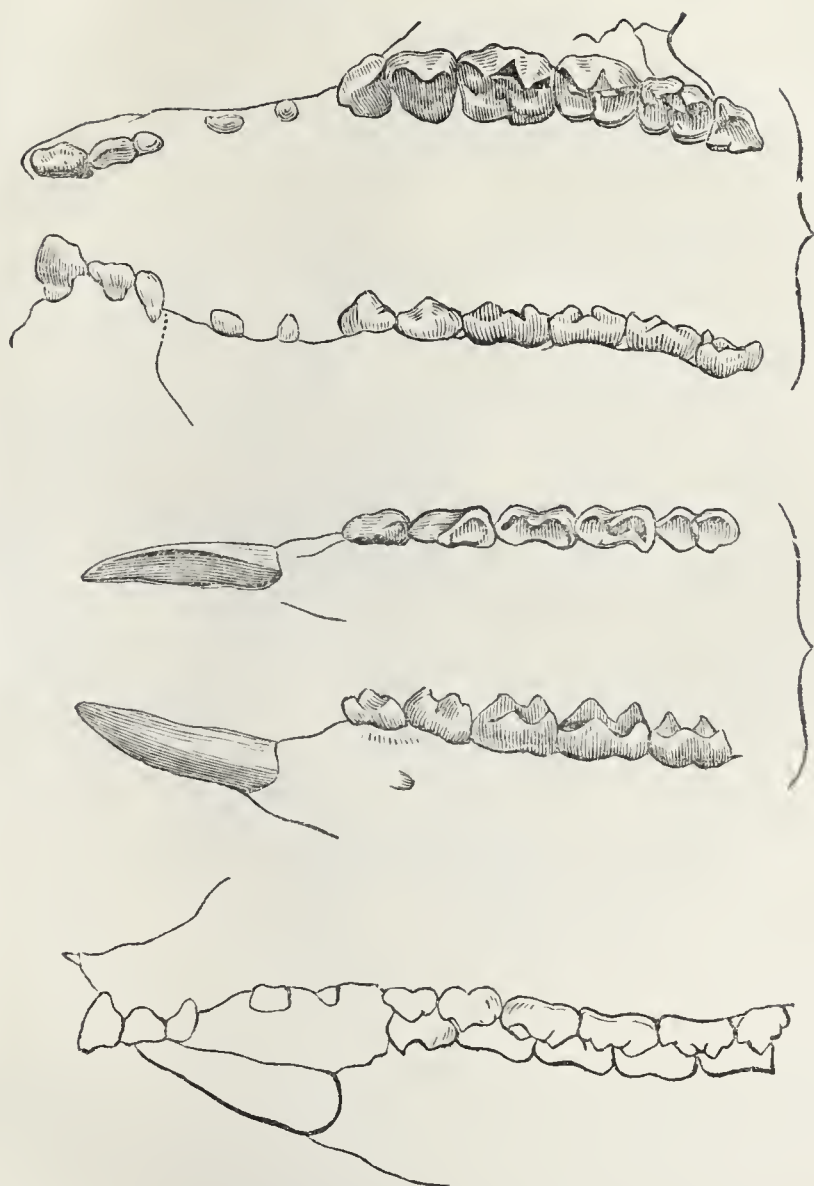
THE SQUIRREL PETAURUS (*Petaurus sciureus*).

This creature belongs to a group of beautiful animals, bearing the same relationship to the phalangers that the flying squirrels do to the ordinary squirrels. They constitute the genus *Petaurus*, subdivided into three minor sections, according to certain modifications of dentition. In the section termed *Belideus*, to which the Squirrel Petaurus belongs, the dental formula stands

$$\text{thus (Fig. 109) :—incisors, } \frac{6}{2}; \text{ canines, } \frac{1-1}{0-0}; \text{ false molars, } \frac{3-3}{4-4}; \text{ true molars, } \frac{4-4}{4-4} = 40.$$

In the figure of the teeth, from F. Cuvier, the number of lower molar teeth (false and true) only amounts to five on each side; in other points also he is erroneous.

The Petauri, or Flying Phalangers, are characterized by a broad expansion of skin on either side of the body between the anterior and posterior limbs; the tail is free, long, and destitute of prehensile power; it forms a balancer to the body in the flying leaps which these animals take, and perhaps assists them in modifying the direction of their career. These animals are nocturnal in their habits, and feed upon fruit, leaves, and insects. During the day they conceal themselves in hollow trees, and are said generally to associate in small flocks. Their aerial evolutions, when the shades of evening have roused them to activity, are described as being peculiarly graceful, and their leaps apparently desperate. The Squirrel Petaurus is one of the most beautiful of the genus. It is



109.—Teeth of Squirrel Petaurus.

a native of New South Wales, and is called by the colonists the Sugar Squirrel and Norfolk Island Flying Squirrel. We have seen two of these animals in captivity: during the day they remained in a state of torpidity, rolled up in a bed of wool and soft hay. At night they became animated, and traversed their cage



110.—Squirrel Petaurus.

with great rapidity, leaping from one part to another, and gambolling in the exuberance of a sportive disposition. At the same time they were timid and by no means remarkable for intelligence. While leaping, the lateral membranes are expanded so as to form a parachute. The following anecdote serves to prove both the daring extent of the leaps taken by these animals, and the power they certainly possess of turning or altering their course:—"On board a vessel sailing off the coast of New Holland was a Squirrel Petaurus, which was permitted to roam about the ship. On one occasion it reached the mast-head, and, as the sailor who was de-

spatched to bring it down approached, it made a spring from aloft to avoid him. At this moment the ship gave a heavy lurch, which, if the original direction of the little creature's course had been continued, must have plunged it into the sea. All who witnessed the scene were in pain for its safety; but it suddenly appeared to check itself, and so to modify its career that it alighted safely on the deck."

The Squirrel *Petaurus* is about eight inches long in the head and body, and as much in the tail. The fur is peculiarly delicate and soft; the general colour above is fine gray, somewhat darker on the head, and white beneath. A black line passes from the point of the nose along the back towards the full-furred tail; and the lateral folds of skin are bounded in front and on the sides by a similar band, which confounds itself gradually with the gray of the body: the outer margins of these expansions are fringed with white. The thumbs of the hind feet are strong, distinctly opposable to the sole, and destitute of a claw. The eyes are full and large. (Fig. 110.)

THE KOALA

(*Phascolarctos cinereus*. *Lipurus cinereus*, Goldf.; *Phasc. fuscus*, Desmar.; *Phasc. Flindersii*, Less.; The Ashy Koala).

The Koala, or Ashy Koala, is the only species of the genus which has been discovered.

This extraordinary animal is thick and stoutly made, with robust limbs and powerful claws: there is no tail. The head is large, the muzzle blunt, and the naked space in which the nostrils are situated is continued along the nasal bones, till it nearly attains the level of the eyes. The ears are large, standing out from the sides of the head, and tufted with long full fur: the eyes are small. The fore feet have each five toes, armed with large sharp claws: these toes are divided into two sets; the first two forming a pair by themselves, and antagonizing with the other three. The hind feet have also five toes, viz. a large and powerful thumb destitute of a nail, and well



111.—Koala.

padded beneath, and four strongly-clawed toes, of which the two first, as in the phalangers, are united together as far as the last joint. It may be here remarked that in some of the phalangers (as Cook's phalanger, &c.) there is a decided tendency in the first two fingers of the fore paws to remain distinct and separate from the rest. The dentition approaches closely to that of the phalangers.

Dental formula :—incisors, $\frac{6}{2}$; canines, $\frac{1-1}{0-0}$; false molars, $\frac{1-1}{1-1}$; true molars, $\frac{4-4}{4-4} = 30$.

The Koala is a native of New South Wales, but does

not appear to be very abundant ; at least it is seldom seen in collections of natural objects from that country. In its habits it is nocturnal and arboreal ; it climbs with great facility, and in passing along the branches suspends itself like a sloth by its claws, which in adults are very powerful. The female carries her young one, when able to leave the pouch, clinging to her back, and long continues her care of it. (Fig. 111.) The Koala however does not live exclusively on the trees : it visits the ground, and there burrows, and that with facility. In the cold season it is said to make a nest in its underground retreat, and retiring to it there to lie dormant. Its food is entirely vegetable, and consists, in part at least, of the young leaves of the gum-trees (*Eucalyptus*). It laps like a dog when drinking, and uses its fore paws in laying hold of the branches while it feeds. Its voice is a soft barking sound. On the ground its gait resembles that of a bear. Length of head and body about 26 inches. The fur is compact, woolly, and of an ashy gray, patched with white over the crupper : the inside of the thighs is rusty-gray.

The colonists term this animal native bear or monkey. By the Yas natives it is called Goribun.

THE WOMBAT

(*Phascolomys Wombat*, Peron and Lesueur; *Didelphis ursina*, Shaw).

The Wombat is the only known species of the genus to which it belongs. It is found in New South Wales, South Australia, and Van Diemen's Land, as well as in some of the islands in Bass's Straits.

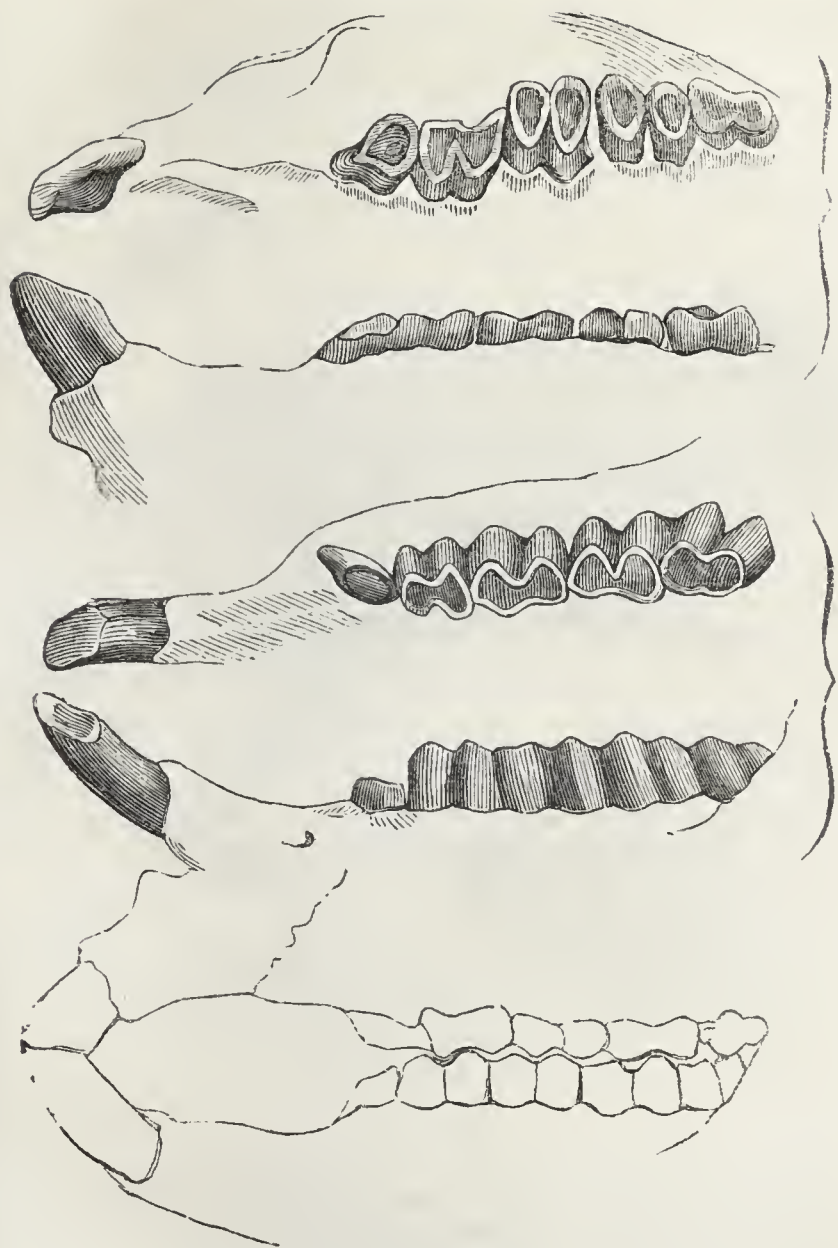
In its general figure this animal is heavy and clumsy : the limbs are short ; the muzzle blunt ; the eyes very small ; the ears short and pointed ; the nostrils widely separated ; the tail a mere tubercle. The feet are broad ; the fore feet have five toes with strong nails for burrowing. The hind feet have also five toes, but the inner is merely a little nailless tubercle. The teeth are formed for grinding roots and other vegetable matters.

Dental formula :—incisors, $\frac{2}{2}$; canines, $\frac{0-0}{0-0}$; molars, $\frac{5-5}{5-5} = 24$. All the teeth are deeply implanted, and hollow at the base. (Fig. 112.)

The fur is moderately long and very coarse, indeed almost bristly ; the general tint is grizzled-brown, or gray mottled with dusky black ; the feet are black ; the under parts of the body dirty-white. The tip of the muzzle is naked. Length of head and body, upwards of three feet. The first account is in Lieut.-Col. Collins's work ('Account of the English Colony in New South Wales,' 1802), where there is an excellent description, an error as regards the dentition of the animal excepted. The details were furnished by Mr. Bass, and drawn up from a specimen obtained at Preservation Island, and sent to the Newcastle museum.

As might be conjectured from its clumsy form and heavy squat proportions, the Wombat is slow and indolent. It lives in burrows, which it excavates to a considerable depth, and in which it quietly reposes during the day, being nocturnal in its habits. Its food is exclusively vegetable. Its temper is placid ; but its intelligence is at a low ratio. When provoked it utters a hissing sound. Its flesh is said to be excellent.

In captivity the Wombat is perfectly contented ; it passes the day in sleep, covered over by straw or other materials ; it feeds during the night, and in the morning resumes its tranquil slumber. Mr. G. Bennett, in his 'Wanderings,' notices one of these animals which was kept at Been, in the Tumat country, in a state of domestication. "It would remain in its habitation till dark ; it would then come out and seek for the milk-vessels, and, should none be uncovered, it would contrive to get off the covers, and bathe itself in the milk, drinking at the same time. It would also enter the little vegetable-garden attached to the station, in search of lettuces, for which it evinced much partiality. If none could be found, it would gnaw the cabbage-stalks without touching



112.—Teeth of Wombat.

the foliage. Although these animals were numerous in the more distant parts of the colony, they are difficult to procure, from the great depth to which they burrow." According to Mr. Bass, though its disposition is gentle, yet it bites and is furious if provoked, and then utters a



113.—Wombat.

low cry between a hissing and a whizzing sound. Mr. Bass chased one of these animals, and lifted it off the ground, carrying it for upwards of a mile, without its exhibiting any discomposure, though it was often shifted from arm to arm. When however he proceeded to secure the animal by tying its legs, while he left it in order to cut a specimen of a new wood, it became irritated, whizzed, kicked, and scratched with all its might, and

snapped off a piece of Mr. Bass's jacket with its powerful incisors. The creature, whose temper was now ruffled, continued during all the rest of the way to the boat to kick and struggle, and only ceased from exhaustion. According to the natives, the Wombat among the mountains westward of Port Jackson never comes out of its burrow to feed till night, but in the islands it is seen to feed during all parts of the day. The stomachs of such as Mr. Bass examined were distended with coarse wiry grass, but these specimens were living on the islands; and as such grass is not found in the hilly districts of the mainland, he concludes that the animal lives upon the sorts of vegetable that circumstances present to it. He observed this animal on some occasions among the dry ricks of seaweed thrown up upon the shores, but could never discover what it was in search of. Its pace is a sort of hobble, something like the awkward gait of a bear. There is little doubt but that the Wombat might easily be naturalized in our island and other parts of Europe.

THE ECHIDNA, OR PORCUPINE ANTEATER

(*Echidna Histrix*. *Myrmecophaga aculeata*, Shaw; the Hedgehog of the Colonists at Sydney).

The Echidna constitutes the only known example of the genus which it represents. It is characterized by the utter want of teeth. The body is stout; the limbs are extremely short and thick; the fore paws are compact, and the toes undivided to the claws: these are five in number, large, flat, and blunt; the inner claw is the smallest. The hind feet are directed obliquely backwards, and are furnished with five claws, of which the first is short, and rises like a thumb at the junction of the foot to the limb. The hind limbs of the male are furnished with a sharp stout spur, situated internally on the tarsus. The head is small, the muzzle elongated into a projecting narrow, beak-like snout, cleft transversely by a very small mouth at the apex. The nostrils are above the mouth, minute and oval. The eyes are small and placed low on the sides of the head; the iris is blue.

There are no external ears. The upper surface of the body and also of the short stout tail is covered by a compact mass of thick sharp spines more or less intermingled with coarse hairs. Under ordinary circumstances these spines are directed backwards, converging obliquely to a central line down the back ; but they are capable of being elevated, and when attacked the animal rolls itself up like the hedgehog, presenting at all points an array of levelled spears. The limbs and under surface are covered with brown hairs. (Fig. 114.)



114.—Echidna.

As might be inferred from the strength of its limbs and size of its claws, the Echidna is a burrowing animal. Its food consists of ants and their young, which it takes by means of a wormlike tongue capable of being protruded to a great distance. It appears to be nocturnal in its habits. Mr. G. Bennett states that the native names of

the Echidna are 'Nickobejan' and 'Jannocumbine.' It is found in New South Wales, the islands of Bass's Straits, and in Van Diemen's Land. According to the writer last quoted, it inhabits the mountain ranges of Australia, and produces its young in December. It burrows with great celerity, and will even work its way under a pretty strong pavement or base of a wall, removing the stones with its claws. "During these exertions its body is stretched or lengthened to an uncommon degree, and appears very different from the short plump aspect which it bears in its undisturbed state."

The Echidna is eaten by the natives, and is said to taste much like young sucking-pig.



115.—Skull of Echidna.

In the 'Proceed. Zool. Soc. Lond.' for 1834, p. 23, will be found the substance of a note from Lieutenant Breton, respecting an Echidna which lived with him for some time in New Holland, and survived part of the voyage to England. The animal was captured by him on the Blue Mountains, and is now very uncommon in the colony of New South Wales. He regards it as being, for its size, the strongest quadruped in existence. It burrows readily, but he knows not to what depth. Previous to embarkation it was fed on ant-eggs and milk, and when on board, its diet was egg chopped small, with liver and meat. Its mode of eating was very curious, the tongue being used at some times like that of the chameleon, and at others in the manner in which a mower uses his scythe, the tongue being laterally curled, and the food, as it were, swept into the mouth: there seemed to be an adhesive substance on the tongue by means of which the food was secured. This individual died suddenly, but Lieutenant Breton agrees with MM. Quoy and Gai-

mard in the opinion that with a little care and attention the animal might be brought alive to Europe.

The skull of the *Echidna* (fig. 115) is remarkable for the convexity of the cranial portion and the extreme prolongation and tenuity of the maxillary bones. The orbit is bounded by an oval rim, the lower portion of which consists of the zygomatic arch. The lower jaw is extremely slender. The structure of the sternal apparatus is the same as in the *Ornithorhynchus*. (Fig. 130.)

THE ORNITHORHYNCHUS, or WATER-MOLE OF THE COLONISTS

(*Ornithorhynchus paradoxus*, Blumenb.; *Platypus anatinus*, Shaw; *Mallangong* and *Tambreet* of the natives of the borders of the Yas river, Murrumbidgee, &c.).

The genus *Ornithorhynchus* is perhaps the most singular of any contained in the class Mammalia, and certainly one of the most interesting, especially to the physiologist. It contains those remarkable creatures (perhaps more than one species) furnished with a duck-like beak and webbed feet, which would seem, even from their external organization, to partake in some degree of the nature of a bird—creatures, the first discovery of which excited the most lively astonishment.

On looking at the *Ornithorhynchus* we are immediately struck with the configuration of the head. Instead of a muzzle gradually continued as we see in other Mammalia generally, it abruptly assumes the appearance of the bill of a duck, being broad, flat, rounded, and covered with a leathery membrane. The outer surface of the upper mandible is grayish black; the palate flesh-coloured; the under mandible paler externally. The edges of both are soft, and the lower, which is the shortest and narrowest of the two, has its edge adapted to a depression under the margin of the upper mandible, which is also channelled with obliquely transverse furrows; those however are merely in the leathery skin. There are no horny laminae as in the bill of the duck. True teeth are wanting; but on each side in either mandible there are

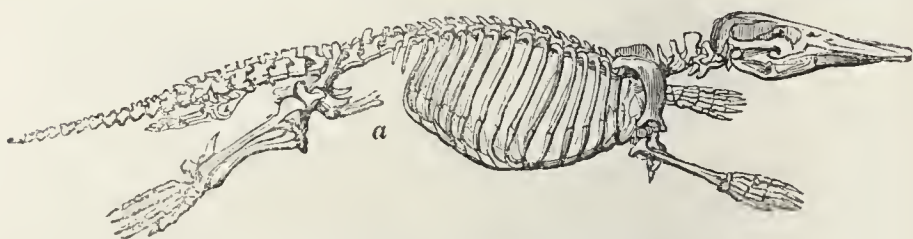


117.—Teeth of Ornithorhynchus.

two horny appendages without roots; one on each side is large and tuberculous, situated on the base of the mandibles, at the posterior part of the mouth; the other forms a long narrow ridge on the anterior part of the mandible along the edge. (Fig. 116.) Capacious cheek-pouches are carried under the skin of the face, from the inside of the mouth, serving as receptacles for food. At the base of the beak, separating between it and the head, there projects a broad loose leathery flap from each mandible, the use of which is probably to defend the eyes and fur of the head from the mud in which the animal grubs, duck-like, in quest of insects. The tongue is short and thick, and covered with long papillæ. The nostrils are two small orifices situated near the apex of the upper

mandible. The eyes are small, but brilliant, and placed rather high in the head. The ears open externally by a simple orifice near the external angle of the eyes, and are capable of being expanded or closed at pleasure.

The fore feet are largely webbed and divided into five toes, terminating in strong blunt burrowing claws. The web which unites the toes is tough and leathery; it extends considerably beyond the claws, and would appear at first sight to act as an impediment to the animal while excavating its long burrow. We do not find, however, that this is the case: it can be folded back at pleasure. The hind feet are smaller and less powerful than the anterior pair: they are divided into five toes armed with



117.—Skeleton of Ornithorhynchus.



118.—Magnified Hind Foot of Female Ornithorhynchus.

sharp claws and webbed, but the membrane is not carried out beyond the roots of the claws. The hind feet are directed backwards as in those of the seal (see skeleton, Fig. 117), and their action is backwards and outwards.

The tarsus of the male is armed with a large sharp moveable spur turned backwards and inwards. It is not used as a weapon of defence, nor are accidental wounds and scratches made by it while struggling in a person's hands attended with ill effects. Formerly this spur was regarded as poisonous. In the female a rudimentary spur may be distinguished. (Fig. 118.)

The body is elongated, low, and depressed: the fur is close and fine, and consists of two sorts, an under layer of soft, short, waterproof wadding, and an outer vest of long fine glossy hair, thickly set, and in many instances assuming a crisped appearance. The tail is strong, broad, flattened, and of moderate length: it is covered

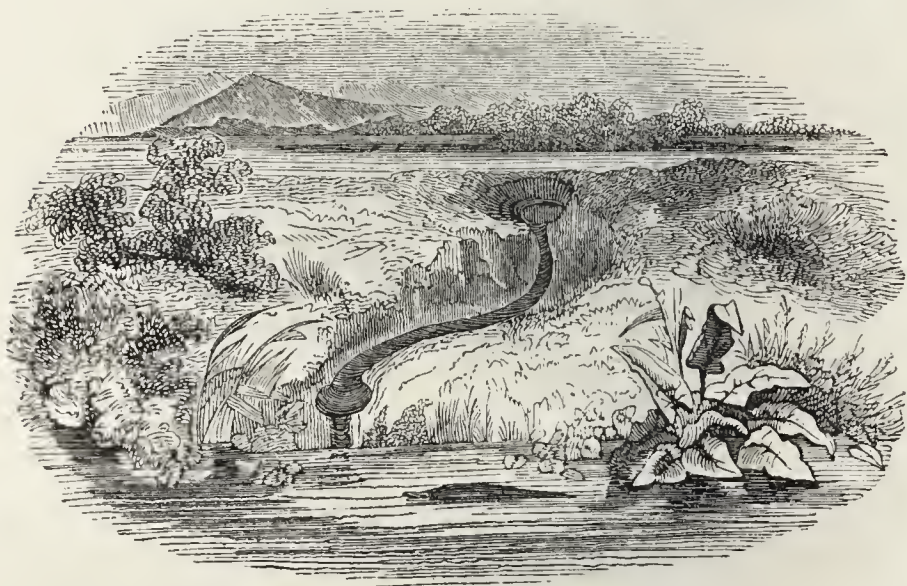


119.—Ornithorhynchus.

above with longer and coarser hairs than those of the body, but its under surface is only scantily furnished. General colour deep brown; head and under parts paler; a whitish spot in front of each eye; average length of head and body, including tail, twenty to twenty-three inches; beak about two inches and a half; tail, four or five inches. (Fig. 119.)

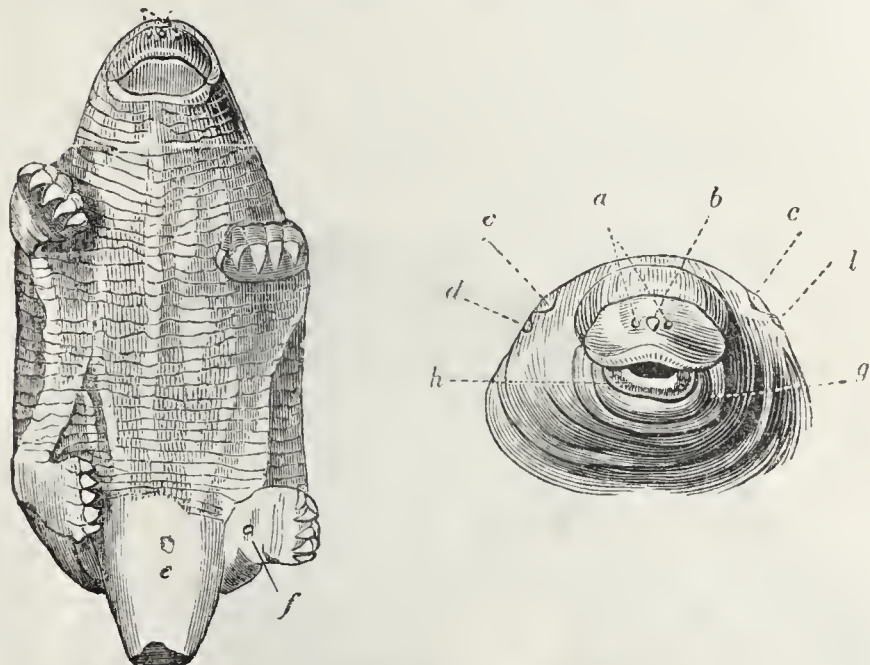
Essentially aquatic, as is sufficiently declared by its outward structure, the *Ornithorhynchus* passes the active part of its existence almost exclusively in the water. The favourite places of resort of this animal are tranquil parts of rivers with high steep banks, and abounding in waterweeds, among which, and in the oozy mud, are the insects, &c., on which it feeds.

Their burrows (fig. 120) are excavated in the steep banks overhanging the tranquil sheets of water in which they seek their food. These burrows are continued in a serpentine form, rising as they proceed, the termination often being at the distance of fifty feet from the mouth. The entrance is generally larger than the rest of the passage, but the termination is again enlarged, so as to be commodious for the parents and their offspring. The



120.—Burrow of *Ornithorhynchus*.

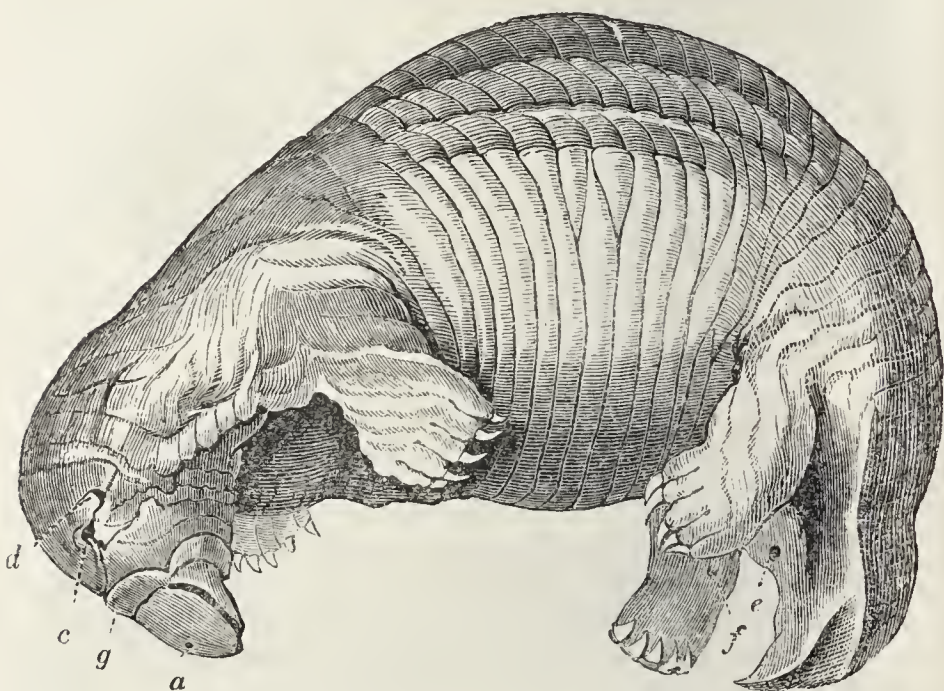
female produces from two to four at a birth, and in the month of November (a summer month in Australia). The young at an early period (immediately after birth, and for some time afterwards) are naked and very small, and their general aspect is very unlike that of the fully developed animal. (Figs. 121 and 122). They are



121.—Smaller Specimen of Young Ornithorhynchus, and Front View of the Mandibles.

curled round, the head and tail being doubled on the abdomen; the skin of the body is thrown into transverse folds; the eyes are merely indicated by the convergence of a few wrinkles on the skin, which passes over these organs, proving that their development does not take place till a considerable time after birth, and, together with the helpless rudimentary condition of the young animal, demonstrating that it is necessarily confined for a long period to the nest in which it is brought forth, and consequently that it does not and cannot follow, as has been conjectured, like a duckling just hatched, its parents to the water. The beak is small, soft, and covered with thin skin. "The margins of the upper mandible are

rounded, smooth, thick, and fleshy ; the whole of the under mandible is flexible, and bends down upon the neck when the mouth is attempted to be opened. The tongue, which in the adult is lodged far back in the mouth, advances in the young animal close to the end of the lower mandible ; all the increase of the jaws beyond the tip of the tongue, which in the adult gives rise to a form of the mouth so ill calculated for suction or application to a flattened surface, is peculiar to that period, and consequently forms no argument against the fitness of the animal to receive the mammary secretion at an earlier stage of existence." (Prof. Owen.)

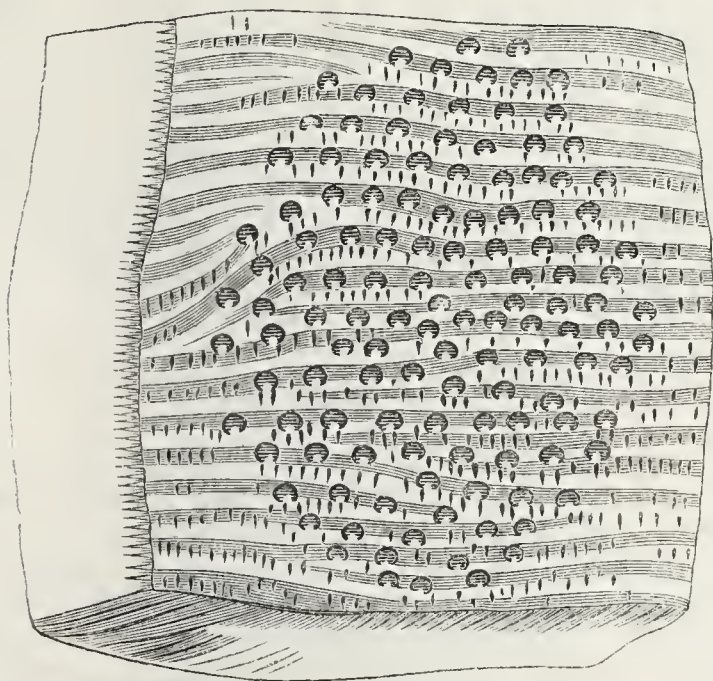


122. —Larger young Specimen of Ornithorhynchus.

That the Ornithorhynchus suckles its young, and possesses a milk-secreting apparatus, are facts which, though once denied, are now incontestably proved.

If the hairs be removed from the abdomen of a female Ornithorhynchus, an areola or oval spot may be distinguished, consisting of a group of ducts, very minute, yet

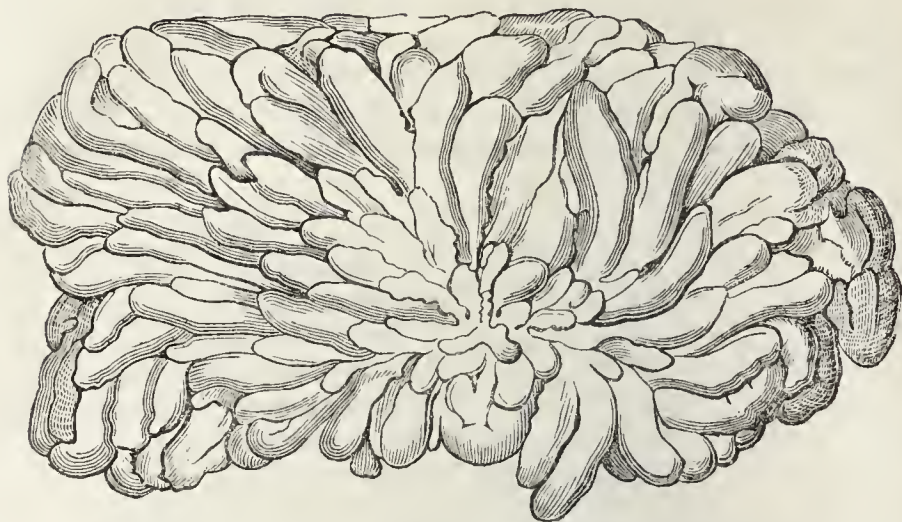
with orifices larger than those in which the hairs are implanted. (Fig. 123.) The areola varies in extent, and the ducts lead to a large gland beneath the skin, and a thin muscular expansion. This mammary gland is composed of a number of lobes, amounting from one hundred



123.—Magnified View of the Mammary Areola.

and twenty to two hundred, and these are the cells in which the milk is secreted, and which oozes from the ducts, and is received by the soft mouth of the young, which is capable of being closely applied to the areola. (Fig. 124.)

Specimens of two young Ornithorhynchi of different sizes were minutely examined by Professor Owen. The smallest of these rather exceeded two inches in length; the largest was double that size, and was one of the two young ones taken with a mother from a nest, on the banks of the Fish river, by Lieutenant the Honourable Lauderdale Maule, and kept alive for about a fortnight by that gentleman. The stomach of this larger specimen was



124.—Mammary Gland of *Ornithorhynchus*, reduced below the natural size.

found to be full of coagulated milk. On carefully inspecting the whole contents with a lens, no portion of worms or bread could be detected, which, Mr. Owen observes, solves the doubt entertained by Lieutenant Maule as to whether the mother nourished this young one with the food which was given to her for her support, or with the secretion afterwards discovered to escape from the mammary pores; for the mother having been killed by accident on the fourteenth day after her captivity, it was observed, on skinning her while yet warm, that milk oozed through the fur on the stomach. That it was really milk on the stomach of the young animal Professor Owen demonstrated, and the matter may be considered as fairly set at rest. Another point which seems to be now established is that the *Ornithorhynchus* is ovoviviparous, or, in other words, produces eggs, which, as in the case of the viper and the viviparous lizard (*Zootoca vivipara*, Bell), are hatched just before exclusion, the young being born rudimentary and naked.

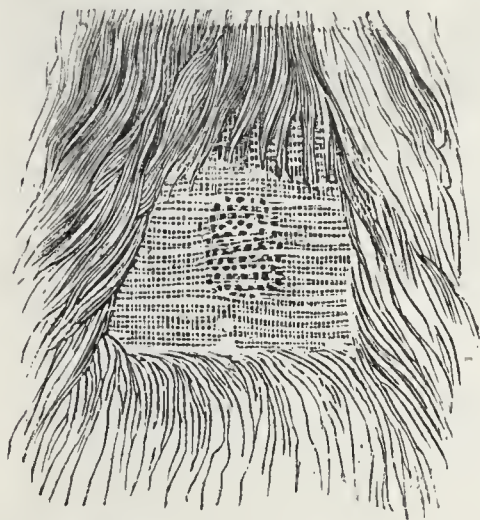
Referring to our illustrations, Fig. 125 exhibits a portion of the integument from the abdomen of the *Ornithorhynchus*, with the hairs removed, to show the

mammary areola (Owen, 'Phil. Trans.');

Fig. 123 a magnified view of the mammary areola, showing the orifices of the ducts of the glandular lobules. Fig. 124 shows the mammary lobular gland of the Ornithorhynchus, reduced below the natural size. (Owen, 'Phil. Trans.')

Fig. 122, view of the larger of the specimens of young Ornithorhynchi alluded to: *a*, the nostrils; *c*, the eyes; *d*, the ears; *e*, the vent; *f*, the orifice and rudimentary spur of the hind foot; *g*, membrane at the base of the mandibles. (Owen, 'Zool. Trans.')

Fig. 121, smaller specimen of young Ornithorhynchus, and front view of head; *a*, nostrils; *b*, prominence on upper mandibles; *e*, vent; *f*, orifice and rudimentary spur on hind foot; *c*, the eyes; *d*, the ears; *g*, the membrane at the base of the mandibles; *h*, the tongue. (Owen, 'Zool. Trans.')



125.—Portion of Integument from the Abdomen of Ornithorhynchus.

The ratio in which the development of the young Ornithorhynchus proceeds is not ascertained.

The Ornithorhynchus has never been brought alive to Europe. From the account of Mr. Bennett, who procured and kept several in Australia, it appears to be a lively interesting creature. Its voice, which it utters when alarmed or disturbed, resembles the growl of a puppy, but in a softer key. It dresses its fur, and seems to

126.—*Ornithorhynchus* combing itself.

delight in keeping it smooth and clean. (Fig. 126.) The mandibles are endowed with great sensibility. Speaking of a family of these creatures which he obtained, and which lived a considerable time in captivity, Mr. Bennett says, "The young sleep in various postures; sometimes in an extended position, and often rolled up, like a hedgehog, in the form of a ball. (Fig. 127.) They formed an interesting group, lying in various attitudes in the box in which I had placed them, and seeming happy and content. Thus, for instance, one lies curled up like a dog, keeping its back warm with the flattened tail, which is brought over it, while the other lies stretched on its back, the head resting, by way of a pillow, on the body of the old one, which lies on its side, with

the back resting against the box ; the delicate beak and smooth clean fur of the young contrasting with the rougher and dirtier appearance of the older one ; all fast asleep." The gambols of the young Ornithorhynchi are thus detailed : " One evening both the animals came out about dusk, and went as usual and ate food from the saucer, and then commenced playing with one another like two puppies, attacking with their mandibles, and raising their fore paws against each other. In the struggle one would get thrust down, and at the moment



127.—Ornithorhynchus sleeping.

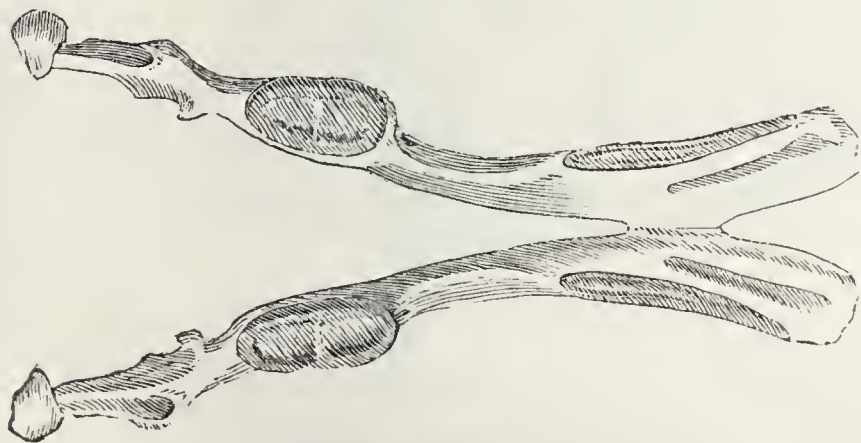
when the spectator would expect it to rise again and renew the combat, it would commence scratching itself, its antagonist looking on and waiting for the sport to be renewed. When running they are exceedingly animated ; their little eyes glisten, and the orifices of their ears contract and dilate with rapidity : if taken into the hands at



128.—Skull of Ornithorhynchus.

this time for examination, they struggle violently to escape, and their loose integuments make it difficult to retain them. Their eyes being placed so high on the head, they do not see objects well in a straight line, and consequently run against everything in the room during

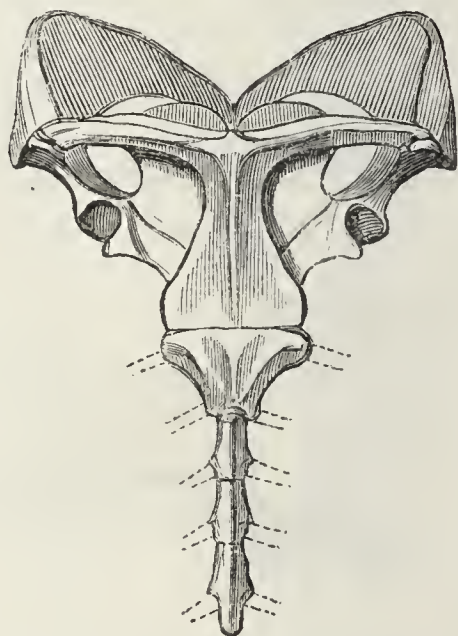
their perambulations, spreading confusion among all the light and readily-overturable articles. I have occasionally seen them elevate the head, as if to regard objects above or around them. Sometimes I have been able to enter into play with them by scratching and tickling them with my finger; they seemed to enjoy it exceedingly, opening their mandibles, and biting playfully at the finger, and moving about like puppies indulged with similar treatment. As well as combing their fur to clean it when wet, I have also seen them peck at it with their beak (if the term may be allowed) as a *duck* would clean its feathers. When I placed them in a pan of deep water, they were eager to get out after being there for only a short time; but when the water was shallow, with a turf of grass in one corner, they enjoyed it exceedingly. They would sport together, attacking one another with their mandibles, and roll over in the water in the midst of their gambols, and would afterwards retire, when tired, to the turf, where they would lie combing themselves. They appeared to be in a great measure nocturnal, preferring the twilight to the bright glare of day."



129.—Lower Jaw of Ornithorhynchus, seen from below.

In fig. 128 the skull of the Ornithorhynchus is represented in different aspects: *a*, as seen from above; *b*, as seen from below; *c*, as seen from behind. The upper figure is that of the under jaw. The skull is

remarkable for the flattened and elongated form of the bones of the facial portion; the intermaxillary bones, which are, as it were, let into projecting maxillaries, diverge, leaving a vast opening (the foramen incisivum). The cranial cavity is considerable; the orbits are small; the zygomatic arch slender and compressed. The suborbital foramen appears on the edge of the upper mandible, its situation being marked by a projection of the bone. The lower jaw is slender and depressed; there are no coronoid processes; the outer sides of the ascending rami (though very narrow) have, as in most, if, indeed, not all the Marsupials, a pit-like cavity for the lodgment of the masseter muscle. The extent of the temporal muscle is trifling. (Fig. 129.) The skull of the Ornithorhynchus can be confounded with that of no other animal.

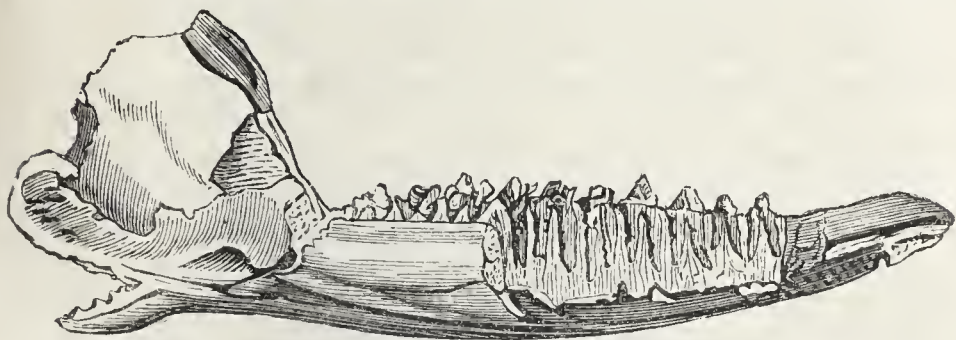


130.—Sternal Apparatus of Ornithorhynchus.

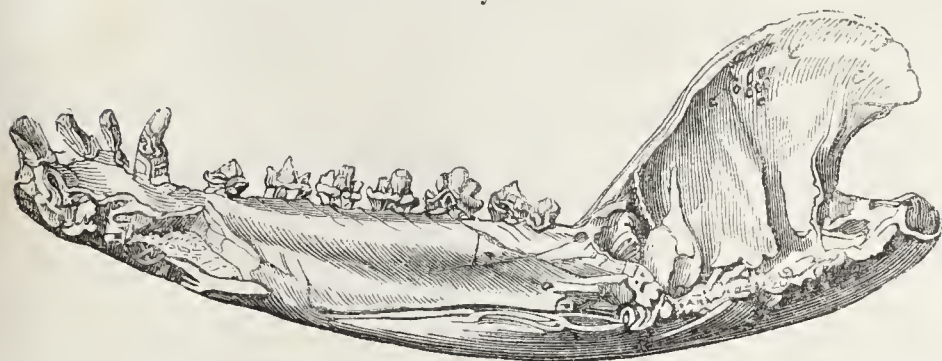
With respect to the sternal apparatus, to which we alluded in our account of the Echidna, it appears to be formed more after the model of that of the Saurian reptiles, than after that of Mammalia. (Fig. 130.)

FOSSIL MARSUPIALS.

Besides the fossil opossum of the Montmartre gypsum (*Didelphys Cuvieri*), and the fossil *Dasyurus*, *Hypsi-prymnus*, *Halmaturus*, *Phascolomys*, and Kangaroo, from



131.—Jaw of Thylacotherium.



132.—Jaw of Phascolotherium.

the Australian bone-caves and breccia, two fossil forms discovered in the Stonesfield oolite, as evidenced by portions of the lower jaw, have recently attracted much attention and no little discussion. Some anatomists,

with M. de Blainville, contend against the Mammal origin of these relics, or at least of one of the forms ; but those who have examined the fossils and read the arguments on either side will, we think, agree with Baron Cuvier and Professor Owen, and assign them to animals of the Marsupial section, which at some epoch tenanted our quarter of the globe. The jaws of these extinct Marsupials, named respectively *Thylacotherium Prevostii*, Owen (fig. 131), and *Phascolotherium Bucklandii*, Owen (fig. 132), are represented of the natural size, and also magnified, in order to show clearly the characters and arrangement of the teeth. Those who wish to enter into the full details respecting these fossil relics will do well to consult the 'Geological Proceedings,' 1838-9; Cuvier's 'Ossements Foss.,' vol. v. ; 'Ann. des Sciences,' 1825 ; and the papers of Mr. Broderip and Dr. Fitton in the 'Zool. Journal,' 1828.

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SKETCHES IN NATURAL HISTORY.

HISTORY

OF

THE MAMMALIA.

VOL. II.

ORDER—CARNIVORA:

CANIDÆ, VIVERRIDÆ, MUSTELIDÆ.

ORDERS—INSECTIVORA; CHERIOPTERA.

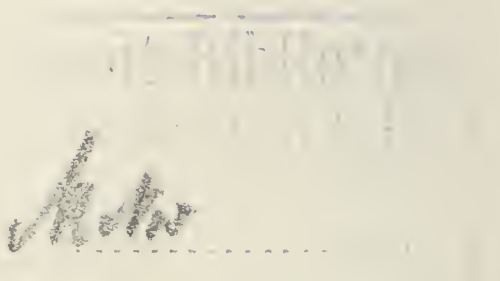
WITH NUMEROUS ILLUSTRATIONS.

IN SIX VOLUMES.

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SKETCH

OF THE

HISTORY OF THE MAMMALIA.

ORDER—CARNIVORA.

FAMILY—CANIDÆ.

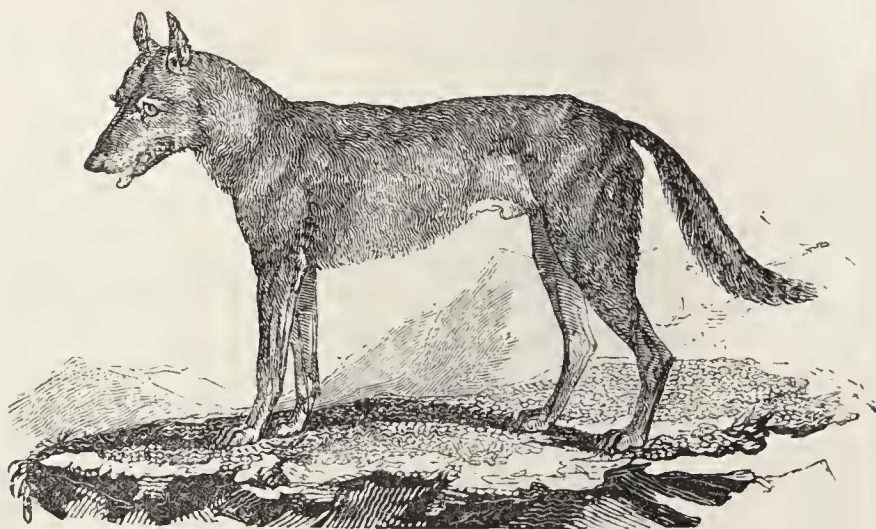
To the most important genus of this family—the Dog—we have given a separate volume. The Canine family includes the Dog, the Wolf, the Jackal, the Fox, and the Lycaon; in other words, all those animals which Linnæus assigns to his genus *Canis*, and which, though agreeing in dentition, and in the digitigrade structure of the feet, may nevertheless with propriety be divided into subgeneric groups. In all the muzzle is elongated; the bony palate terminates in a line with the hinder margin of the posterior molars, in this respect differing from that of other Carnivora; and there are two true molars on each side both of the upper and lower jaw. The genus *Megalotis*, in the form of the lower jaw, in the dentition, and in the prolongation of the bony palate, offers an exception to the general rule. We begin with the one the nearest allied to the dog.

THE WOLF.

(*Canis Lupus*). Λύκος, Aristotle; le Loup, French; il Lupo, Italian.

A robust but gaunt frame, a skulking or irresolute gait, ferocity mingled with cunning and cowardice,

and a wild yet sinister expression of the physiognomy, characterize this beast of prey. (Fig. 1.) Spread throughout Europe and various parts of Asia, it is more particularly in mountain and forest districts that the wolf prevails, where the population is scanty, and collected into small towns or villages, with a wide country around, destitute of human dwellings. In the Pyrenees, the Carpathian Mountains, in Poland, Hungary, some parts of Austria, France, Italy, and Spain; in Norway, Sweden, and Russia, the wolf is yet common; as well as in western Asia, and the border territories included in Europe. Formerly this animal was abun-



1.—Wolf.

dant in the British islands, and the plague and terror of the country. Verstegan, in his 'Restitution of decayed Intelligenece in Antiquities, concerning the most noble and renowned English Nation,' 1605, observes that January was called Wolf-monat by the Anglo-Saxons, "because people were wont in that moneth to be more in danger to be devoured of wolves than in any season els of the yeare, for that through the extremity of cold and snow those ravenous creatures could not find other beasts suffieient to feed upon." The universal fear which the wolf, where numerous, would naturally

inspire, was formerly heightened by superstition, and fiends or malignant beings were imagined as having power to assume the form and power of this dreaded animal. Lycanthropos of the Greeks, the Were-wolf of the Anglo-Saxons, and the Loup-garou of the French, had reference to some such preternatural monster, whose name was associated with all that is horrible and mysterious. Conspicuous then, and dreaded for its power and ferocity, we can scarcely wonder that the wolf should have had its name assumed, or given to men of distinction, by our barbarous but warlike forefathers, among whom such appellations as Ethelwolf, Eadwolf, Berthwolf, and many more, were common.

It must not be supposed, however, that our Saxon ancestors tamely suffered the wolf to ravage the country. The attempt at extirpating this animal commenced in the tenth century under the reign of Edgar, and appears to have succeeded in the thirteenth century, during the reign of Edward I., as no historical mention is made of any royal edict, subsequently to that period, to promote their destruction. The last record of their existence in any formidable numbers was in 1281. It is said by Mr. Topham, in his notes to Somerville's 'Chace,' that it was in the wolds of Yorkshire where a price was last set upon a wolf's head. In Scotland and Ireland the wolf remained for a considerable period longer. In 1577, according to Holinshed, these animals were destructive to the flocks in Scotland, and in Ireland they were exterminated only at the beginning of the last century.

In almost every department of France infested by the wolf there is a society called Société de Louveterie, the object of which is to keep that animal down; and premiums, varying in the amount according to the sex and age of the animals killed, are likewise paid. The means hitherto employed, however, have been inadequate to effect the purpose.

In Poland wolves are numerous and formidable; and they increased especially in the years from 1807 to 1815, in the province of Posen, after its separation from Prussia. In 1814 three grown persons and sixteen

children were devoured by them in the small circle of Wongrowice alone. When Prussia regained the province of Posen in 1815, no time was lost by the government in getting rid of so great a public nuisance ; and in that province within five years, from 1815 to 1819 inclusive, 4618 dollars were paid by the government in rewards for killing wolves. Latterly wolves have again increased in that province ; for the use of fire-arms having been in a great measure prohibited in Poland, after the revolution, these animals are rapidly multiplying there, and invade the neighbouring territories.

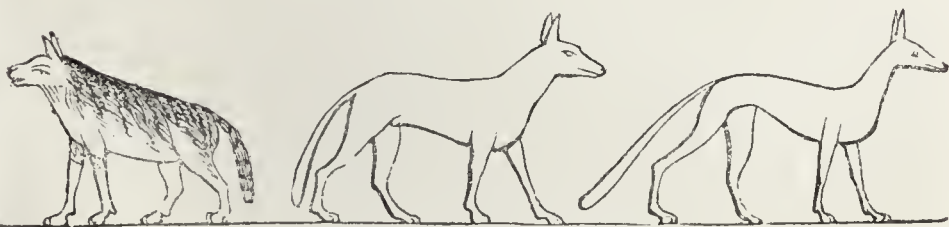
In the parish of Briala, district of Rawa, during the month of August, 1837, four girls were torn to pieces not far from their own houses. What must these animals be in winter, when even in summer they are thus daring !

Mr. Lloyd, in his 'Field-Sports in the North of Europe,' relates many narratives respecting these animals ; it would appear that they are less dangerous to man than might be expected, though they sometimes, especially when combined in troops, attack travellers with great audacity. A gentleman attached to the embassy of St. Petersburg, says Mr. Lloyd, related to me the following circumstance :—" It happened, at no great distance from St. Petersburg, and only two years previously, a peasant, when one day in his sledge, was pursued by eleven of these ferocious animals. At this time he was only about two miles from home, towards which he urged his horse at the very top of his speed. At the entrance of his residence was a gate, which happened to be closed at the time ; but the horse dashed this open, and thus himself and his master found refuge in the court-yard. They were followed, however, by nine out of the eleven wolves ; but most fortunately, at the very instant these had entered the enclosure, the gate swung back on its hinges, and thus they were caught as in a trap. From being the most ferocious of animals, the nature of these beasts, now that they found escape impossible, became completely changed : so far, indeed, from offering molestation to any one, they slunk into holes and corners,

and allowed themselves to be slaughtered almost without making resistance." In the government of Livonia, in Russia, a district of about two hundred and fifty miles long and one hundred and fifty broad, the following animals were, according to official reports, destroyed by wolves in 1822 :—horses, 1841 ; fowls, 1243 ; cattle, 1807 ; calves, 733 ; sheep, 15,182 ; lambs, 726 ; goats, 2545 ; kids, 183 ; swine, 4190 ; young pigs, 312 ; dogs, 703 ; geese, 673.

Desmarest says that the wolf is solitary and nocturnal, but that in winter it unites in troops, which attack horses and men. The sense of smell is very acute, but its speed is not very great, and it wearies out its victim by dint of untiring perseverance. When in full chase of its prey, it gallops along, pertinaciously following the track of the fugitive. The description of a troop of wolves in pursuit is admirably given by Lord Byron in his poem of 'Mazeppa :—

" We rustled through the leaves like wind,
Left shrubs and trees and wolves behind ;
By night I heard them on the track,
Their troop came hard upon our back.
With their long gallop, which can tire
The hound's deep hate and hunter's fire ;
Where'er we flew they follow'd on,
Nor left us with the morning sun ;
Behind I saw them scarce a rood
At daybreak winding through the wood,
And through the night had heard their feet
Their stealing, rustling step repeat."

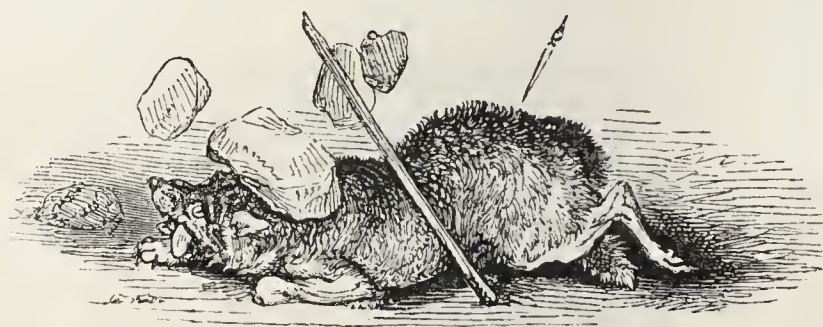


2.—From Egyptian Sculpture.

From the numerous allusions to the wolf in the Scriptures, it is evident that it must have been well

known formerly in Syria—and indeed also in Egypt, for we find it figured on ancient sculptures, together with the hyæna and greyhound. (Fig. 2.) At present, however, this animal is seldom met with in Syria, although it still exists in that region, but keeps itself concealed.

So habitually cautious and suspicious is the wolf, that it is difficult to take it in traps, and for the same reason anything like the appearance of artifice deters it from an attack. (Fig. 3.) It has been supposed the wolf never carries his tail elevated, but this is not altogether correct; we have often watched the wolves in the Zoological Gardens gallop round the enclosure with the tail raised as it is also when the animals are in chase of prey; and, as Dr. Richardson states from observation, when they gambol with each other.



3.—Wolf in Trap.

When pursued the wolf rushes along, with his muzzle almost to the ground, his eyes like glowing fire, the hair of his neck and shoulders erect, and his tail lowered and drawn close; when out of danger, he slackens his pace, raises his head, sniffs about, and whisks his tail around, as if exulting in his escape; but if brought to bay by hounds, he defends himself to the last, and often kills and maims some of his antagonists before he falls overpowered by numbers. The Kirghese Tartars employ a large hawk in the chase, which fastens upon the animal's head, and tears its eyes. (Fig. 4.)



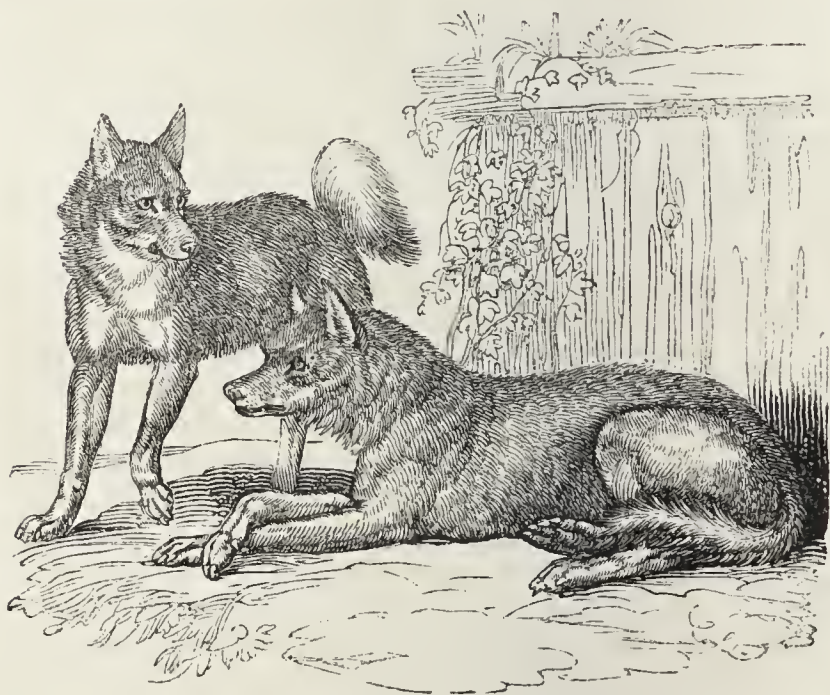
4.—Wolf.

Fierce as the wolf is, like the hyæna it can be tamed and even domesticated, but they require to be taken very young. M. F. Cuvier gives a very interesting account of a tame wolf, which showed all the affection that the most gentle dog could evince towards its master. When full-grown, he was presented by his owner to the menagerie at Paris. For many weeks he was quite disconsolate at the separation from his master, who had been obliged to travel; he would scarcely take any food, and was indifferent to his keepers. At length he became attached to those about him, and he seemed to have forgotten his old affections. His master returned after an absence of eighteen months; the wolf heard his voice amidst the crowd in the gardens of the menagerie, and, being set at liberty, displayed the most violent joy. Again was he separated from his friend, and again was his grief as extreme as on the first occasion. After three years' absence, his master once more returned. It was evening, and the wolf's den was shut up from any external observations; yet the instant the man's voice was heard, the faithful animal set up the most anxious cries; and the door of his cage being open,

he rushed towards his friend, leaped upon his shoulders, licked his face, and threatened to bite his keepers when they attempted to separate them. When the man left him, he fell sick, and refused all food; and from the time of his recovery, which was long very doubtful, it was always dangerous for a stranger to approach him. He appeared as if he scorned any new friendships.

Other instances of domestication are on record, and, indeed, from our own personal experience, we hesitate not to state that the wolf may be completely reclaimed—more so than the Australian dingo.

The power of the wolf, especially in the muscles of the head, neck, and shoulders, is immense; and his bite is terribly severe, generally cutting out the flesh with a snap. Among themselves they fight often with great desperation, the combat ending with the death of the weaker. It is said that wolves wounded by the gunshot of hunters or travellers are torn in pieces and devoured by their fellows,



5.—Mixed Breed of Dog and Wolf.

The average height of the wolf at the shoulders is about two feet six inches; the female rears her young in some cave or gloomy recess, and produces from five to nine young at a birth. These are born with the eyes closed, as in the dog. In the defence of her offspring the female is furious, and greatly to be dreaded. The voice of the wolf is a prolonged howl, resounding dismally through the stilly darkness of the night. The wolf will breed with the dog, and we give (Fig. 5)

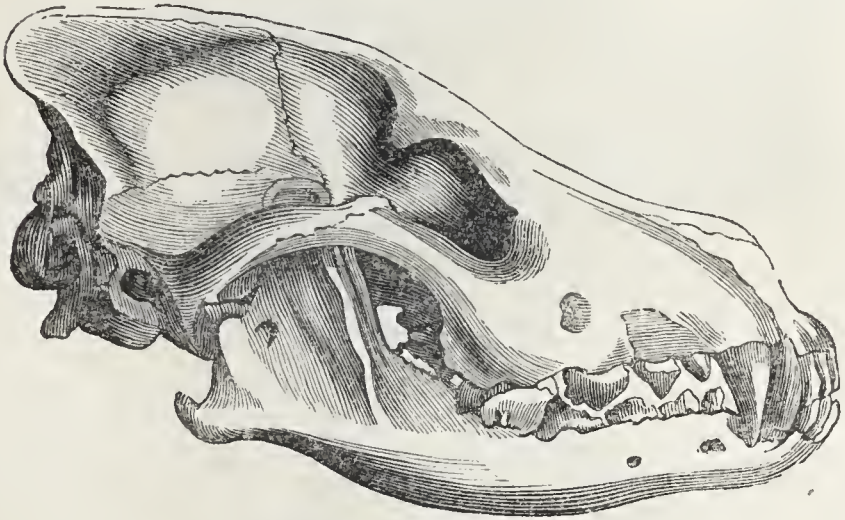
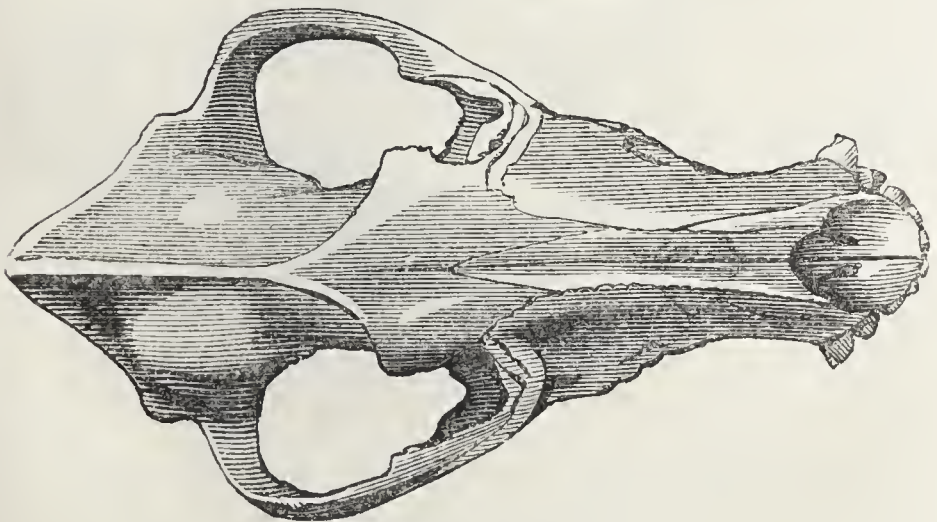


Fig. 6.



7.—Skull of European Wolf.

specimens of the mixed breed ; but it is not to be thence concluded, as Hunter does, that they are all of one species : no one, we think, will now regard the wolf and the jackal as identical ; nor is there any more ground for believing that the dog is either the one or the other, than for assuming that the wolf and the jackal are one.

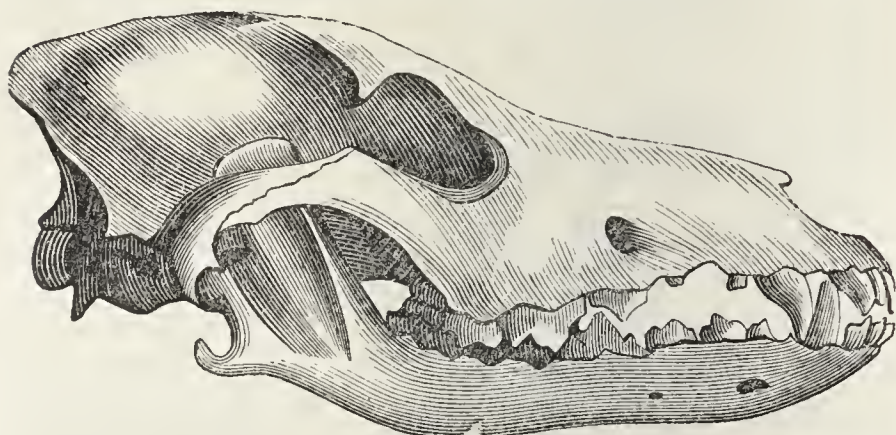
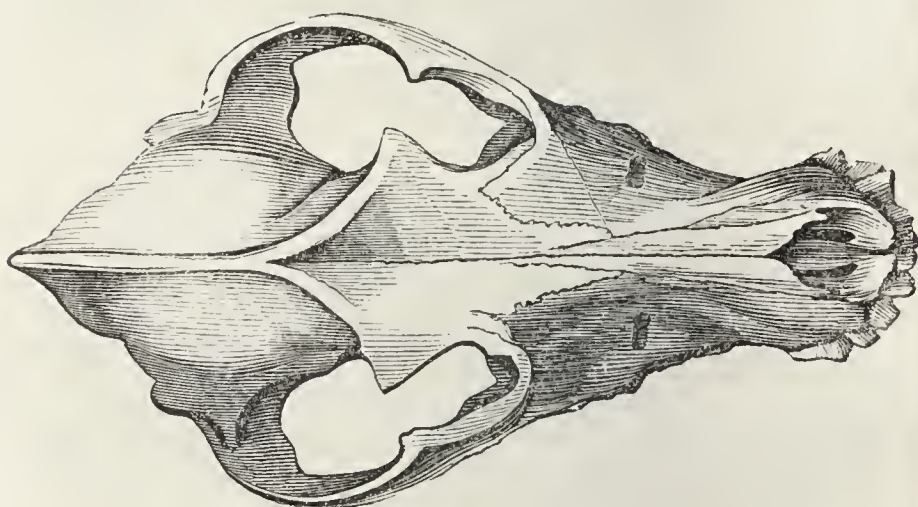


Fig. 8.



9.—Skull of Canadian Wolf.

Figs. 6 and 7 are the skull of the European wolf, in two views : it differs in various minor details from the skull of the Canada wolf, of which Figs. 8 and 9 are two similar views.

Fig. 10 is a spirited delineation of the head of the wolf, for comparison with that of the nearest of the dogs, and we add the dentition, though it has been given in the preceding volume.



10.—Head of Wolf.

Dental formula :—Incisors, $\frac{6}{6}$; Canines, $\frac{1-1}{1-1}$; Molars—false $\frac{3-3}{4-4}$, carnassières $\frac{1-1}{1-1}$, true $\frac{2-2}{2-2} = 42$.

The true molars below are small, the last being even minute, as is the first false molar, and often dropping out early. (Fig. 11.)

The family has the fore feet with five toes; hind feet with four toes, and sometimes a fifth on the tarsus; claws not retractile.

On the southern side of the Pyrenees there exists a variety perhaps of the wolf, termed, from its colour, the Black Wolf (*Canis Lycaon*, Linn.), the Loup noir of Buffon. These animals are asserted to be more ferocious than the ordinary gray wolf, but perhaps without any foundation.

The common wolf of North America differs in some respects from its European relative, and is perhaps a distinct species. It wants the gaunt appearance, the comparatively long jaw and tapering nose, the high ears,



11.—Teeth of Dog.

long legs, slender loins, and narrow feet of the European wolf. Its frame also is more compact, the fur finer and thicker, the muzzle more obtuse, the head larger and rounder, and the forehead broader and more arched:

the limbs are shorter, and the tail more fox-like and bushy.

Dr. Richardson, in his 'Fauna Boreali-Americana,' enumerates several varieties of this North American wolf, depending on colour, viz. the gray, the white, the pied, the dusky or clouded, and the black. Black wolves abound on the Missouri, and, according to the Indians, black and gray wolves occur in the same litter. The dusky or clouded wolf was regarded by Say as a distinct species, and named by him *Canis nubilus*. (Fig. 12)



12.—Dusky or Clouded Wolf.

The American wolf agrees in its general habits with the wolf of our continent, though it appears to be less formidable as far as man is concerned. Indeed Captain Lyons, in his observations on the wolves of Melville Peninsula, states that both English and Esquimaux were accustomed to pass them without any weapon, or even a

stick ; “ the animals, however, exhibited no symptoms of fear, but rather a kind of tacit agreement not to be the beginners of a quarrel, even though they might have been certain of proving victorious.”

These wolves hunt in packs, and when pressed for food their audacity is astonishing. They will seize the Esquimaux dogs before their masters' faces, and carry them off—for though bold in attacking the bear, this breed of dogs, as previously noticed, fears the wolf, and makes but a slight resistance. They have been known not only to steal provisions from under a man's head in the night, but even to come into a traveller's bivouac and carry off some of his dogs. “ During our residence at Cumberland House, in 1820,” says Dr. Richardson, “ a wolf which had been prowling round the fort, and was wounded by a musket-ball and driven off, returned after it became dark, whilst the blood was still flowing from its wound, and carried off a dog from amongst fifty others, that howled piteously, but had not courage to unite in an attack on their enemy.”

The American Wolf is extremely cunning, and in attacking moose or Wapiti deer, animals which exceed it in speed, it has recourse to a singular stratagem. Several combine, and arrange themselves in the form of a semicircle, and thus advance upon their prey, so as either to hem it in or drive it over a precipice. Captain Franklin often found the remains of deer which had been thus dashed down steep cliffs and devoured, and he states that this is a frequent expedient when the plains are bounded by precipitous cliffs. “ Whilst the deer are quietly grazing, the wolves assemble in great numbers, and, forming a crescent, creep slowly towards the herd, so as not to alarm them much at first ; but when they perceive that they have fairly hemmed in the unsuspecting creatures, and cut off their retreat across the plain, they move more quickly, and with hideous yells terrify their prey, and urge them to flight by the only open way, which is towards the precipice ; appearing to know that, when the herd is once at full speed, it is easily driven over the cliff, the rearmost urging on those that

are before. The wolves then descend at leisure, and feed on the mangled carcasses."

On one occasion a troop of wolves endeavoured to put the same stratagem into practice against Dr. Richardson. Having the first watch, he "had gone to the summit of a hill, and remained seated, contemplating the river that washed the precipice under his feet, long after dusk had hid distant objects from his view. His thoughts were perhaps far distant from the surrounding scenery, when he was roused by an indistinct noise behind him; and, on looking round, perceived that nine white wolves had ranged themselves in form of a crescent, and were advancing apparently with the intention of driving him into the river. On his rising up, they halted; and when he advanced, they made way for his passage down to the tents."

A recent writer in 'Blackwood's Magazine,' (No. 393,) while describing in a vivid manner 'Life in the Far-West,' says there are four kinds of wolves frequenting that district, and gives the following interesting account of some of their habits:—

"The white wolf is the invariable attendant upon the buffalo; and when one of these persevering animals is seen, it is a certain sign that buffalo are not far distant. Besides the buffalo-wolf, there are four distinct varieties common to the plains, and all more or less attendant upon the buffalo. These are, the black, the gray, the brown, and last and least the coyote, or cayeute, of the mountaineers, the '*wach-unkamănet*' or 'medicine-wolf' of the Indians, who hold the latter animal in reverential awe. This little wolf, whose fur is of great thickness and beauty, although of diminutive size, is wonderfully sagacious, and makes up by cunning what it wants in physical strength. In bands of from three to thirty, they will not unfrequently station themselves along the 'runs' of the deer and the antelope, extending their line for many miles,—and the quarry being started, each wolf will follow in pursuit until tired, when it relinquishes the chase to another relay, following slowly after until the animal is fairly run down, when all hurry to the spot and

speedily consume the carcase. The cayote, however, is often made a tool of by his larger brethren, unless, indeed, he acts from motives of spontaneous charity. When a hunter has slaughtered game, and is in the act of butchering it, these little wolves sit patiently at a short distance from the scene of operations, while at a more respectful one the larger wolves (the white or gray) lope hungrily around, licking their chops in hungry expectation. Not unfrequently the hunter throws a piece of meat towards the smaller one, who seizes it immediately, and runs off with the morsel in his mouth. Before he gets many yards with his prize, the large wolf pounces with a growl upon him, and the cayote, dropping the meat, returns to his former position, and will continue his charitable act as long as the hunter pleases to supply him.

“Wolves are so common on the plains and in the mountains, that the hunter never cares to throw away a charge of ammunition upon them, although the ravenous animals are a constant source of annoyance to him, creeping to the camp fire at night, and gnawing his saddles and *apishamores*, eating the skin ropes which secure the horses and mules to their pickets, and even their very hobbles, and not unfrequently killing or entirely disabling the animals themselves.

“Round the camp, during the night, the cayote keeps unremitting watch, and the traveller not unfrequently starts from his bed with affright, as the mournful and unearthly chiding of the wolf breaks suddenly upon his ear: the long-drawn howl being taken up by others of the band, until it dies away in the distance, as some straggler passing within hearing answers to the note, and howls as he lopes away.”

In the dreary realms that advance into the Polar Sea,

“Where the wolf and Arctic fox
Prowl amidst the lonely rocks,”

Captain Franklin and his companions, during their arduous journeys, were often obliged to dispute their

scanty food with the lean wolves, that would scarcely retreat. On one occasion, when they had captured a moose deer, and had buried a part of the body, the wolves absolutely dug it out from their very feet, and devoured it, while the weary men were sleeping. On another occasion, when the travellers had killed a deer, they saw by the flashes of the *Aurora borealis* eight wolves waiting round for their share of the prey. Sometimes, however, the wolves were their caterers, and helped them to a welcome meal. When a group of wolves and a flight of crows were discovered, the travellers knew there was a carcase to be divided, and they sometimes succeeded in obtaining a share of the prey, if it had been recently slaughtered.

Of the American wolves we may notice the Prairie wolf (*Canis latrans*, Say), which inhabits the plains of the Missouri and Saskatchewan, as well as those of the Columbia. It is smaller and fleetier than the common wolf, associates in large troops, and dwells in burrows on the plains remote from the forests. In Mexico is found a distinct species of wolf (*Canis Mexicanus*, Desm.); and a species termed the red wolf (*Canis jubatus*, Desm.) inhabits the Pampas of La Plata. The Antarctic wolf (*Canis Antarcticus*, Desm.) is a native of the Falkland Isles, and seems to be an intermediate link between the wolves and foxes. It feeds principally upon a species of goose (*Anser leucopterus*), goes in packs, which wander about by day, but more commonly in the evening, and dwell in holes which they burrow. This species is about fifteen inches in height at the shoulder; the tail is short, and white at the tip; the limbs are short, but the contour of the head is wolf-like. It is termed by Pennant the Antarctic Fox.

Colonel Sykes has described a wolf from Dukhun, under the title of *Canis pallipes*, which he states to be numerous in the open stony plains of that region, but not to be met with in the woods of the Ghauts. ('Zool. Proceeds.' 1830.)

Mr. Hodgson notices the common European wolf as occurring in the lower region of the Nepâl Mountains.

THE JACKAL. (*Canis aureus*.)

Of the animals known by the name of Jackals, one species (*Canis anthus*) is a native of Senegal; another, the Cape jackal (*Canis mesomelas*), is a native of the Cape of Good Hope; and a third, the common jackal (*Canis aureus*), is spread from the north of Africa, through Syria, Persia, and the greater part of India. Colonel Sykes states it to be numerous in Dukhun, where it is called Kholah by the Mahrattas. It is somewhat larger than a fox, but its tail is shorter in proportion, reaching only to the hock; its head is short, with a pointed muzzle; the general colour above is gray, abruptly divided from a paler tint spread over the under surface; the tail is slightly tipped with black. (Fig. 13.)



13.—Jackal.

Figs. 14 and 15 represent the skull of the Jackal, in two views; it differs from those both of the European and American wolf. These skulls may be compared with those of the various breeds of dogs previously given.

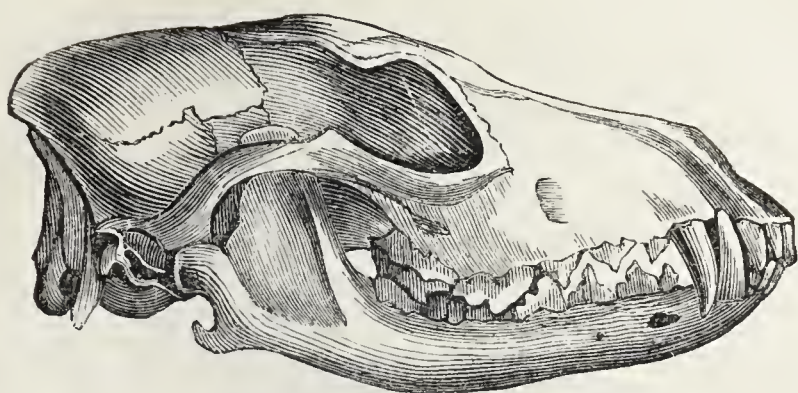
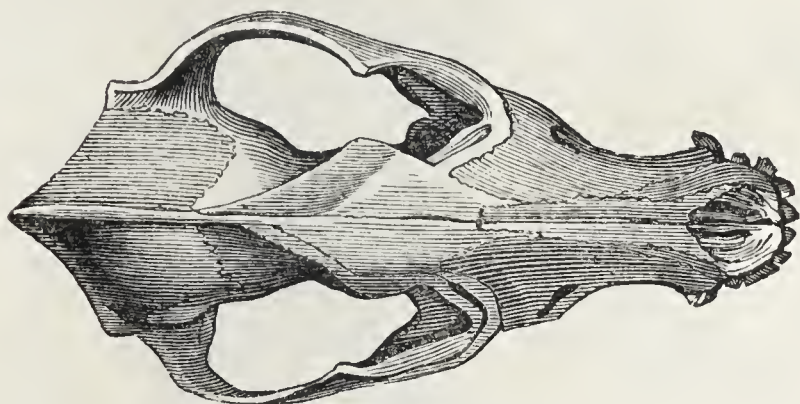


Fig. 14.



15.—Skull of Jackal.

This animal is most probably the Shual of the Scriptures. It is the Chical of the Turks; Sciagal, Sciugal, Sciachal, or Shacal of the Persians.

The jackal dwells in troops, which lie concealed in holes and burrows during the day, but come forth at night to hunt for food, giving chase to sheep or antelopes and other animals, like the wolf, stealing fox-like into fowl-roosts, and attacking any animal they are capable of overcoming. (Fig. 16.) They do not, however, confine themselves to living prey, carrion and offal of every description being greedily devoured. Nor are roots and fruits less acceptable; in the vineyard, indeed, they



16.—Jackals.

make great havoc, and their fondness for grapes is notorious. The "shriek" of the jackal is terrific. Those travellers who have heard them, describe the nocturnal yells of these animals as extremely piercing and dissonant ; now close, now at a distance, troop answering troop from different points, themselves unseen, while their fearful chorus breaks the stillness of the hours of darkness. Their cries thus heard amidst the ruins of cities of ancient date might seem "to listening Fancy's ear" like the wail of legions of spirits over the departed glories of other days. Mouldering ruins, fallen temples, crumbling tombs, and craggy rocks are the abodes of the jackal.

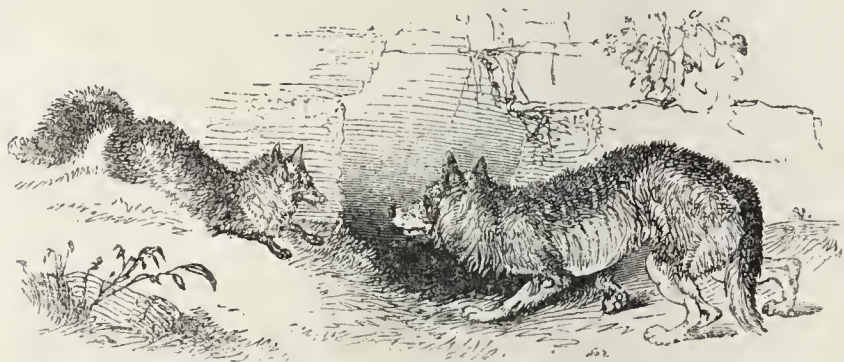
Sly and suspicious in its disposition, this animal when taken young is nevertheless easily tamed, and loses that unpleasant odour which renders the wild animal almost unbearable. We have seen in the Zoological Gardens a hybrid between the jackal and dog.

THE COMMON FOX.

(*Canis vulpes*, Linn. ; *Vulpes vulgaris*, Brisson). Volpe of the Italians ; Rapasa, Spanish ; Rapoza, Portuguese ; Fuchs, German ; Vos, Dutch ; Raff, Swedish ; Rev, Danish ; Tod, Scottish provincialism ; Llwynog, and female Llwynoges, of the Welsh. (Fig. 17.)

The common fox (the representative of the sub-genus *Vulpes*, characterised by a linear pupil and a long bushy tail) is too well known to need a minute description. This wily animal is common in our island, and in most parts of Europe, extending into Northern Asia, and is everywhere celebrated for its cunning and rapacity. As its linear pupil intimates, the fox is crepuscular or nocturnal in its habits, but is occasionally seen abroad during the day. In general, however, it is as the dusk of the evening advances that the fox steals from its burrow, with noiseless steps, to prowl about for prey. His senses of smell and hearing are extremely keen, and he listens, and snuffs the breeze, attentive to every sound, appreciating

every odour. His eyes gleam, as he creeps along in a crouching attitude, intent upon his prey. His movements are all stealthy: he surprises the rabbit gambolling near its burrow; the hare in her form; the poultry on the perch. He slaughters all he can, reserving the overplus for a future exigency, and for that purpose buries it in the earth. In times of scarcity field-mice, frogs, weasels, and even insects are devoured. On the Continent the fox visits the vineyards, being as partial to the ripe grapes as is the jackal.



17.—Wolf and Fox.

The fox is solitary in his habits, and dwells alone in a burrow, which he has either made or usurped, and which is generally in some secluded situation, not readily to be discovered, and in the neighbourhood of a rabbit-warren, preserves of game, or farms. Its power of endurance and its speed have in our country recommended it to all lovers of the chase, for whose gratification the breed is preserved where possible. Foxes have been known to run before the hounds fifty miles at a stretch: when hard pressed, the animal neither loses his courage nor self-possession; he puts in practice every expedient which cunning dictates, to baffle the hounds or conceal him from their search; and if all fail, he dies defending himself to the last, without uttering a cry.



17.*—The Common Fox.

In all ages the fox has been celebrated for its wiles and cunning, and in a country like our own, where it has more than ordinary occasion for the exercise of craft and watchfulness, it becomes doubly suspicious. Hence the most tempting bait will scarcely ever induce it to enter a trap. The disposition of the fox is portrayed in the expression of its physiognomy. The sharp ears and muzzle, the oblique eye with a linear pupil, and the peculiar curl of the upper lip, displaying the canine teeth, and especially observable when the animal is excited and ready to snap, proclaim a mixture of craftiness, vigilance, and fierceness.

When prowling in the dusk, or watching for rabbits along the borders of the coppice, it proceeds with its limbs bent in a crouching attitude, with ears erect and gleaming eyes, intent upon its prey, and at the same time quick to take the slightest alarm and dart off to the place of its concealment. The figure in the preceding page is an admirable delineation of the fox on his twilight prowl, stealthily creeping upon his victim, yet alive to his own danger. Though the fox is nocturnal in his habits, he is not exclusively so; it is not often, however, that he ventures abroad during the day. We have ourselves once or twice seen a fox by the edge of a wood in full day; and, during a recent visit to Essex, two foxes were observed in the afternoon in a bean-field, near a farm-yard, the scene of many of their exploits. In the same farm-yard, a few weeks previously, the shepherd's dog (a powerful animal) surprised and seized a fox in the morning, who defended himself with the utmost determination, when one of the men coming to the dog's assistance (which was not needed), in endeavouring to strike the fox with a stick, struck the dog, upon which the latter let go his hold and allowed the fox to escape.

Innumerable are the stratagems which the fox employs in the acquisition of his prey. He reconnoitres the precincts of the farm-yard, and acquaints himself with its topography, and the arrangement of the sheds and buildings; neither a high wall nor palings obstruct

him : he leaps over the one, or creeps under the other, glides noiselessly to the poultry-house, and seizes his victim, often without disturbing the rest of the feathered sleepers : generally, however, he is not content with one, but puts most or all to death, for he has not only to gratify his instant appetite, but to provide against a future day. Domestic poultry, ducks, or geese, are equally acceptable. In this habit of providing for future contingencies, the fox resembles the dog, which we know buries the bones he does not want at the time, returning to them when his inclination tempts him. Thus the fox, having made havoc among ducks or fowls, if time permits, carries them off, and hides them in the earth, not in a single place, but in many places, so that, if one of his hoards be discovered by a brother robber, he has other resources to apply to. Dr. Weissenborn assures us, that “ a few years ago a fox entered in broad daylight the poultry-yard of the parsonage of Sentzke, in Westhavelland, and succeeded in killing twenty fowls, and burying nineteen in the neighbouring garden. When the animal was entering the garden with the twentieth, it was observed and took to its heels. On account of its burrow being distant, it had availed itself of so favourable an opportunity of laying in a store near the yard, which for several days and nights running it tried to bring away to a safer place, until it was caught in one of the traps set for it.” To this he adds, “ I can testify that a fox will even in winter save half a hare towards the night to come. In my youth, one morning after a night during which there had been a moderate fall of snow, I hit upon the track of an old hare accompanied by that of a fox. I followed them into the open field about an English mile, when I came to the spot where the hare had been killed and partly devoured ; but observing in the continuation of the fox’s track that something had been dragged, I had the curiosity to follow it farther, and at the distance of a few hundred paces found the posterior half of the hare in an excellent condition, buried in the snow under a little bush. I confess the hare was so well carved,

that I had no objection to partaking of Mr. Reynard's fare, preferring at dinner—

‘No doubt,

A rogue with venison, to a saint without.’”

Rabbits, pheasants, and partridges are in some places destroyed in great numbers by the fox; the former indeed are especial favourites as food, and in surprising them the subtle animal displays the most consummate address; besides these, in times of scarcity, field-mice, frogs, and even weasels and polecats, are seized and devoured. Dr. Weissenborn, however, asserts that even the severest hunger cannot compel it to eat the flesh of birds of prey.

Besides animal diet, the fox will feed upon sweet berries, and exhibits a great predilection for grapes: in our island these dainties are not within its reach, but on the Continent it visits the vineyard when the fruit is ripe, and commits considerable mischief. The sweetness of the fruit is no doubt grateful to the animal's palate, and it may be observed that the dog soon becomes very fond of sugar. This partiality for sweets leads the fox occasionally to plunder the bee-hive, as it is asserted, notwithstanding the stings of the enraged inhabitants of the overturned temple of honey-stored cells, from whose annoyance he rids himself by rolling upon the ground, and ultimately secures his prize. For ourselves, we never knew any instance of this kind, though many of the devastation of poultry-yards adjoining to gardens in which were rows of bee-hives. We do not deny, however, that instances of this animal plundering the hive may have happened. The kinkajou of South America, the ratel of Africa, and other animals, plunder the nests of the wild bee.

Mr. Daniel (‘Rural Sports’) defends the fox from the accusation of killing lambs, urged against it by the farmer. Mr. Bell, on the contrary, says, “it has been known not unfrequently to carry off a young lamb.” We should certainly say from our own experience that young lambs are very frequently the prey of this sanguinary animal, and that his title of “robber of the fold” is by no means

misapplied. More than once have we heard the farmer's lamentations and vows of vengeance on discovering the palpable proofs of the caitiff's depredation. In Germany, as Dr. Weissenborn assures us, the fox destroys the roe, and even the young of the red-deer. In the forests during the winter the fox, he observes, "fares most abundantly when the snow is from one and a half to two feet deep, and a hard frost succeeding a short thaw has produced an icy crust sufficiently firm to carry the fox, but not the roe." Not only is the swiftness of the former then comparatively much greater, but the roe or young red-deer to which it gives chase soon bleeds at the shins, and falls an easy prey to its pursuer.

The female, upon whom devolves the entire labour of rearing her cubs, breeds in April. She produces from five to eight at a birth, preparing for them a nest at the bottom of her burrow, lining it with dry leaves, moss, and hay. At this period her maternal solicitude is strongly manifested: she employs every artifice to conceal her offspring from discovery, and defends them with indomitable courage; and if she suspect her retreat is discovered, she carries them away one by one to a place of greater safety. A female fox has been known to carry a cub in her mouth during a severe chase of nearly an hour, and only drop it at last from the absolute impossibility of longer retaining her hold compatibly with the freedom of breathing so necessary in her harassing situation. Mr. Daniel ('Rural Sports') has recorded a curious instance in which the female fox departed from her ordinary habits, in order to the more perfect security of her young. In April, 1784, a terrier belonging to the narrator of the circumstance scented a fox to the bottom of a pollard-tree, then up the tree, which the dog vainly made repeated efforts to ascend, till at length the whipper-in, climbing the tree, lifted the dog before him; there in a hole twenty feet from the ground was the fox, with four cubs which had been littered there for safety, and to this hiding-place she must have ascended by the assistance of the roughness of the bark and the boughs alone.

The young ones, or cubs, of the fox are very playful, and, as we have seen puppies do, are fond of endeavouring to catch their own tails, turning round and round in the effort; at about the age of four months they leave the female's protection and shift for themselves. When captured, even at the earliest age, and brought up in confinement, with every kindness, the fox still retains its suspicious character: it may perhaps display some degree of familiarity towards the person who has attended to it and supplied it with food, but it manifests nothing of the gratitude and attachment of the dog, and on the approach of strangers will almost always conceal itself, or, should they attempt to touch it, repel their advances with a bite. To attempt to tame a full-grown fox is useless: it exhibits the utmost impatience of restraint—tries by every means to regain its freedom, and if it cannot succeed, pines, becomes spiritless and dejected, and soon dies. It is essentially an animal "*feræ naturæ*," to which liberty is dearer than life or limb.

Indeed, there are instances well authenticated of foxes caught by the leg in a trap freeing themselves by biting off the confined and perhaps broken member. Dr. Weissenborn cites a case in which a person whom he knew broke one of the fore-legs of a fox with a rifle-bullet, when the animal, being hampered and annoyed by the leg dangling about, turned angrily round and bit it off. He relates other instances, which we will not quote, proving the creature's indomitable resolution and endurance of pain. Mr. Bell adduces the following interesting fact from a correspondent, which shows that, when deprived of a limb, the fox, as if conscious of his condition, departs from his usual method of seeking safety by flight before the hounds:—"I remember once, when out hunting, the hounds found a fox, who did not leave the cover, but kept running from one part of it to another. Just as a hound was about to seize him he jumped over the dog, and thus saved himself. This tedious sport was kept up for a long time, till Reynard, being thoroughly tired with so many leaps and so many enemies, at last fell a prey to them. The huntsman on

taking him up found that he had lost one of his fore-legs. The cover being entirely of furze, and not large, I could see on all sides of him during the hunt, and was much pleased with the many elegant and quick leaps which the poor three-legged fox made to save himself from destruction."

The voice of the fox is a sort of yelp, which, however, it never exerts when watching the movements of its prey, or creeping into the preserve or farmyard. Bewick unhesitatingly asserts from his own observations that the dog and fox will breed together, notwithstanding Buffon's negative. Mr. Bell, who admits that the belief is general, observes that he has in vain endeavoured to trace any valid ground for it. We have often seen sharp-nosed dogs which were called fox-dogs, and have been at the same time assured that they were a cross between the two animals: but on a close investigation we always found that important links in the chain of evidence were wanting; and we have reason to believe that Bewick has based his assertion on nothing more than common hearsay.

It would seem that the fox becomes attached to his old haunt, and that, if caught and removed from it even to a great distance, he has, like the dog, the faculty of tracing the road home. During the time, say Mr. Daniel, that the old Duke of Grafton kept his hounds at Croydon, his Grace's pack were occasionally supplied with foxes from Whittlebury forest: they were sent in the first instance to London, in the venison-cart, and thence were conveyed the next morning to Croydon in a hamper behind the Duke's carriage, when they were immediately turned out before the hounds. A stout fox, conveyed in this manner, was hunted and escaped. Some time afterwards the huntsman suspected that the same animal had been a second time sent from Whittlebury; and to verify the fact, if it happened again, he had him marked previously to his being chased: he escaped. A third time was he taken in his old haunts, and at length fell a victim to the hounds.

In Italy there exists a species of fox (*Canis (vulpes)*)

melanogaster) closely allied to the common species. To Dr. Rüppel we are indebted for a knowledge of the *Vulpes famelicus*, the *Vulpes variegatus*, and the *Vulpes pallidus*, natives of Nubia and the adjacent territories.

THE EGYPTIAN FOX (*Canis Niloticus*).

In Egypt and Syria there is a species of fox, called Tahaleb by the Copts, Sabora by the Arabs ; it is the *Canis Ægyptiacus* of Sonnini ; the *Canis Niloticus* of Geoffroy. (Fig. 18.)

It is the size of our common fox, but the ears are



18.—Egyptian Fox.

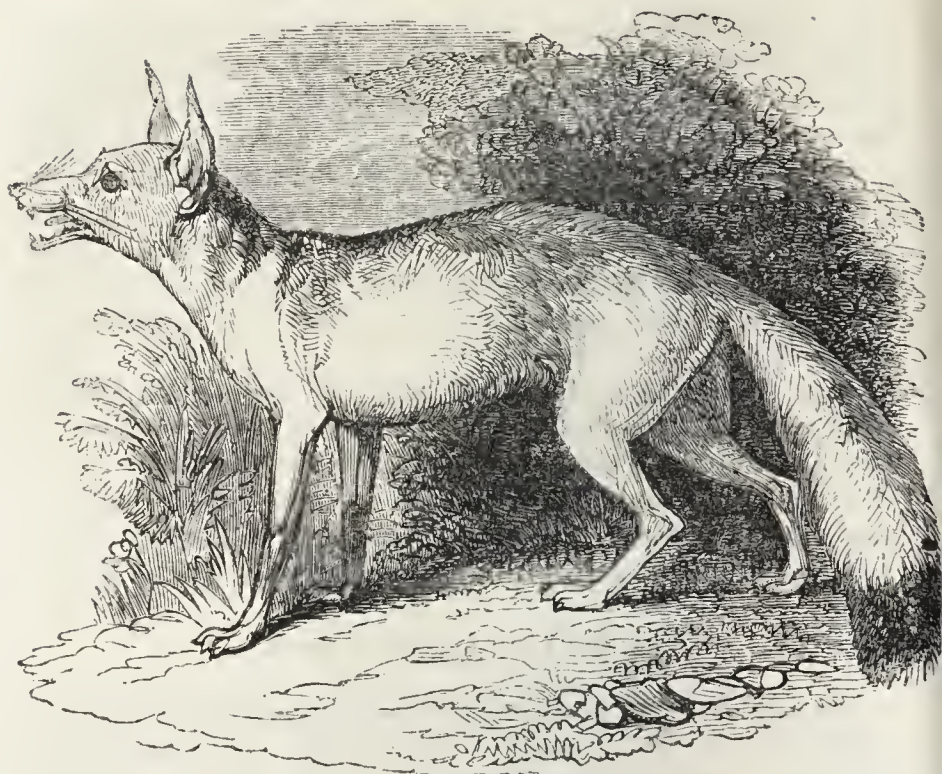
wider apart and longer, and it stands somewhat higher on the limbs. Foxes, apparently of this species, are very abundant in the stony country about Bethlehem, and are also numerous near the convent of St. John in the desert, especially about the vintage time, and are then very destructive in the vineyards, which must be strictly watched in order to prevent their incursions. These animals live in burrows, and have the general habits of the common European fox, to which they are nearly related.

The craft of this animal supplies several Scriptural allusions. Ezekiel (xiii. 4) stigmatizes false prophets as foxes; and our Saviour (Luke xiii. 32) calls Herod a fox, in describing the wily and tortuous policy of that bad man. The fur is used in Syria for common purposes, but the animal is rarely hunted for the sake of his skin.

THE CAAMA (*Canis Caama*).

Of the African foxes, which are numerous, we give a specimen of the Caama of the Cape of Good Hope (*Canis (vulpes) Caama*), one of the smallest of its race. (Fig. 19.) A few individuals of this species are to be met with within the limits of the colony, but its favourite residence seems to be more to the northward; though there it is becoming less and less numerous, owing to the skins being much in request among the natives as a covering for the cold season. So important are these skins considered, that many of the Bechuanas are solely employed in hunting the animal down with dogs, or laying snares in the places to which they are known to resort. In common with other foxes this is a great enemy to birds which lay their eggs upon the ground; and its movements in particular are closely watched by the ostrich during the laying season.

When the caama has surmounted all obstacles in procuring eggs, he has to encounter the difficulty of getting at their contents; but even for this difficulty his cunning finds an expedient, that, namely, of pushing them forcibly along the ground, until they come in contact with some



19.—Caama.

substance hard enough to break them, when the contents are speedily disposed of. The natives, from having observed the anxiety of the ostrich to keep this animal from robbing her nest, avail themselves of this solicitude to lure the bird to its destruction; for, seeing that it runs to the nest the instant a fox appears, they fasten a dog near it, and conceal themselves close by, and the ostrich, on approaching to drive away the supposed fox, is frequently shot by the concealed hunter.

Of the Asiatic foxes we may notice the small Indian insectivorous fox (*Canis Bengalensis*), found in Bengal, and also in the Nepâl hills: the fox of the Dukhun, called Kokree by the Mahrattas (*Canis Kokree*, Sykes), and the hill fox of the Himalayan Mountains (*Canis Himalaicus*), remarkable for the beauty of its fur. It is not uncommon in Doon and in Kumaon. (See 'Proceeds. Zool. Soc.' 1836, p. 103.)



20.—American Red Fox.

AMERICAN RED FOX

(*Canis fulvus*, var. *decussatus*).

It has been the opinion of many naturalists, and even of Cuvier, that the European fox extends over the northern portion of the American continent; we consider, however, the red fox (*Canis (vulpes) fulvus*) of that portion of the globe to be a distinct species. It differs from its European congener in the same points and degrees as does the wolf of the one country from that of the other. The American fox is in fact to be distinguished by the breadth of its feet, and their consequent capacity for progression on the snow, and by the quantity of long hair clothing the back part of the cheeks, which, in conjunction with the shorter ears and nose, gives the head a more compact appearance. The red fox has a much finer brush than the European, and

is altogether a larger animal. The fur of the body is full, long, soft, and of a bright rufous brown ; the skin is therefore valued as an article of trade, and about eight thousand are annually imported into England from the fur countries, where the animal is very abundant, especially in the wooded parts. It is not, however, confined to the colder latitudes ; its range, in fact, extends throughout the whole of the United States. In habits and manners the red fox agrees with our common Reynard, but possesses neither the same wind nor the same vigour and power of endurance. (Fig. 20.)

“ It runs,” says Dr. Richardson, “ for about a hundred yards with great swiftness, but its strength is exhausted in the first burst, and it is soon overtaken by a wolf or a mounted huntsman.” Foxes of various gradations of colour, termed Cross Foxes, are common in the fur countries of North America. These are considered by Dr. Richardson and most naturalists to be varieties of the red fox, and such is the opinion of the native hunters, than whom none are more likely to possess accurate knowledge on such points. The ordinary cross fox is distinguished by a gray fur mingled with black, which latter colour prevails over the shoulders. A rarer and more valuable variety is the Black or Silver Fox (*Canis fulvus*, var. *argentatus*). Dr. Richardson states that seldom more than four or five of this variety are taken in a season at one post, though the hunters no sooner find out the haunts of one than they use every art to catch it, because its fur fetches six times the price of any other fur produced in North America. This fox is sometimes found of a rich deep glossy black, the tip of the tail alone being white ; in general, however, it is silvered over (“ sable silvered”), the end of each of the long hairs of the fur being white, producing a beautiful appearance. A fine specimen is preserved in the Museum of the Zool. Soc.

The Virginian Fox (*Vulpes Virginianus*) appears to be a distinct species, and so most certainly is the Kit, or Tricoloured Fox (*V. cinereo-argentatus*), of which the skins are common in the shops of furriers. This animal

is of small size, and is numerous on the plains extending from the Saskatchewan to the Missouri, and on those of Columbia. It prefers the open country, at a distance from wooded districts, where it dwells in deep burrows of its own excavation, and is extremely vigilant and fleet. Dr. Richardson suggests that it may be regarded as the American representative of the Corsac Fox of the deserts of Tartary, being similar to that species in habits and manners, and frequenting localities of the like character.

THE ARCTIC FOX

(*Canis (Vulpes) Lagopus*).

Terreanée-arioo of the Esquimaux of Melville Peninsula; Terieniak of the Greenlanders; Wappeeskeeshew-makkeeshew of the Cree Indians; Peszi of the Russians.

In the high northern latitudes of the globe the Arctic fox is the sole representative of its race. Its range extends through Siberia, along the borders of the Arctic Ocean, through the bleak regions of the Esquimaux and the dreary realms of Greenland. (Fig. 21.)

“These foxes,” says Dr. Richardson, “inhabit the most northern lands hitherto discovered.” In North America their southern limit appears to be about latitude 50° . They are numerous on the shores of Hudson’s Bay, north of Churehill, and exist also in Behring’s Straits. They breed on the sea-coast, and chiefly within the Arctic circle, forming burrows in sandy spots, not solitary, like the red fox, but in little villages, twenty or thirty burrows being constructed adjoining to each other. We saw one of these villages on Point Turnagain, in lat. $68\frac{1}{2}^{\circ}$. Towards the middle of winter they retire southwards, evidently in search of food; keeping as much as possible on the coast, and going much farther to the south in the districts where the coast-line is in the direction of their march. Captain Parry relates that the Arctic foxes, which were previously numerous, began to retire from Melville Peninsula in November, and that by January few remained. Towards the centre of the continent, in lat. 65° , they were seen only in the winter,



21.—Arctic Fox.

and then not in numbers. They are very scarce in lat. 61° , and in lat. 53° two only were seen in forty years! "Herne says that when taken young the Arctic fox may be domesticated in some degree, but he never saw one that was fond of being caressed." Though not destitute of intelligence, the Arctic fox, unlike the common fox, is unsuspicious and destitute of caution: it has been known to stand by while the hunter was preparing a trap, and on his retiring to run headlong into it. Captain Lyon received fifteen from a single trap in four hours. The voice of this species is a kind of yelp, and, when a man approaches their breeding-places, they put their heads out of their burrows and bark at him, allowing him to come within range of shot. They appear to have the

power of decoying other animals within their reach by imitating their voices.

“ While tenting,” says Captain Lyon, “ we observed a fox prowling on a hill side, and heard him for several hours afterwards in different places imitating the voice of a brent-geese.” Eggs, young birds, blubber, and carrion of any kind, constitute the food of this fox—especially different species of lemmings, which are greedily devoured. In general form the Arctic fox resembles the European species, but is considerably smaller, and, owing to the great quantity of white woolly fur with which it is covered, is somewhat like a little shock-dog. The brush is large and full, affording an admirable covering for the nose and feet, to which it acts as a muff when the animal sleeps. Although the head is not so pointed as in our English species, yet it has that air of slyness which is so characteristic of all foxes. The eyes are clear and bright, and of a hazel colour.

Captain Lyon remarks that the muzzle of the female is shorter than that of the male, and has less of cunning and more of mildness in its expression. The ears are short and thickly covered with hair, and their edges appear as if they had been cropped. The cheeks are ornamented by a projecting ruff, which extends from behind the ears quite round the lower part of the face, to which it gives an agreeable appearance. The legs are rather long than otherwise, and show great strength of muscle. The feet, which are large, are armed with strong claws. “ When the animal is standing still, the hind legs are so placed as to give the idea of weakness in the loins, which is certainly not the case, as few animals can make more powerful leaps. The general weight is about eight pounds, although some were found to be as low as seven, and a few as high as nine pounds and a half when in good case.”

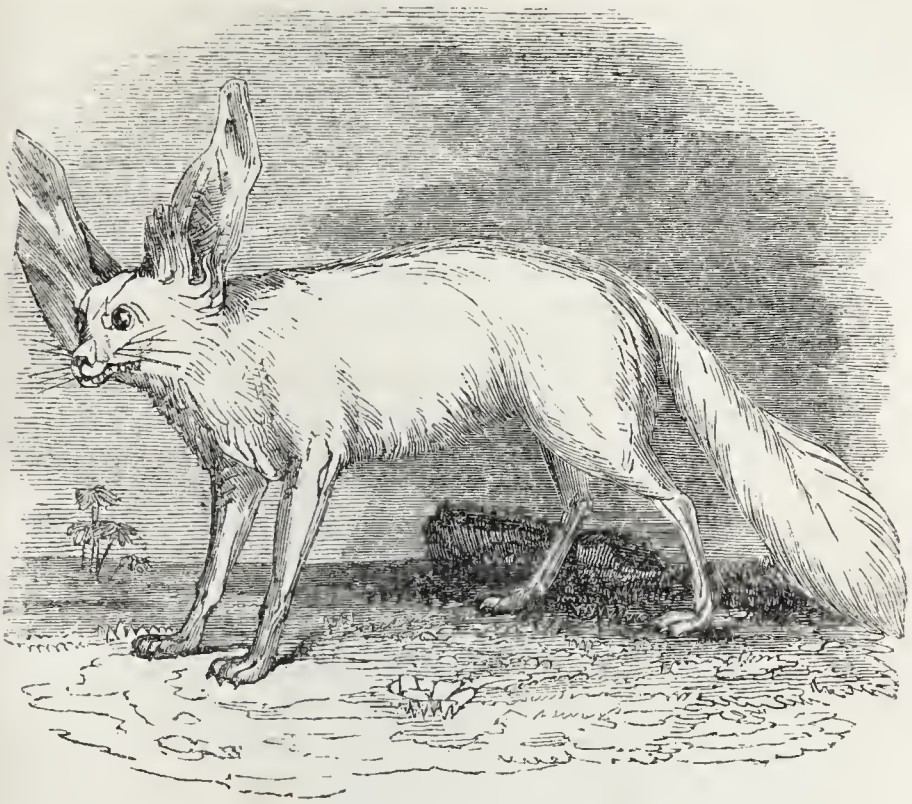
The Arctic fox is cleanly, and free from any unpleasant smell: it is habitually watchful, and, when asleep, opens its eyes at the slightest noise near it. Day is its season of rest: during the night its activity is extreme, and it gambols or hunts for food till daybreak. While

in pursuit of its prey it is mute, but in captivity, or when irritated, it utters a short sharp bark. When first taken its rage is ungovernable, nor is it ever thoroughly reconciled to confinement. Those which Captain Lyon had were observed to hide their food, like the dog, under lumps of snow; snow also was their substitute for water, and they would roll in it with evident satisfaction. "When the snow was slightly scattered on the decks, they did not lick it up, as dogs are accustomed to do, but, by repeatedly pressing with their nose, collected small lumps at its extremity, and then drew it up into the mouth with the assistance of the tongue." Though a few Arctic foxes remain white during the summer, it is only in the winter that the majority assume this pure snowy livery, accompanied by an increase in the fulness and thickness of the fur, which deeply covers even the soles of the feet. In summer the fur is thinner, and of a dusky brownish ash or leaden tint; and the callous pads of the toes become partially visible.

THE FENNEC

(*Megalotis Fennecus*). *Canis Zerda*, Zimmerman; *Megalotis Cerdo*, Illiger; *Fennicus Cerdo*, Lacépède; *Viverra aurita*, Blumenbach; *Fennec* of the Arabs, Bruce.

For our first knowledge of this elegant little animal we are indebted to the celebrated Abyssinian traveller Bruce, who discovered it in Nubia. So little, however, was its true character understood, that in the third volume of the Supplement to Buffon's work it is termed "animal anonyme," and even M. Geoffroy for some time regarded it as identical with the Senegal Galago; in fact, the French naturalists were disposed to sink the fennec as a new species of *canis* altogether. Colonel Denham, however, recognised the animal in the interior of North Africa, and accurately figured it in the Zoological Appendix to his Travels: he also brought a specimen to this country, and thus established the truth of Bruce's description. Rüppel rediscovered it in Nubia, where



22.—Fennec.

Bruce had first seen it. (Fig. 22.) A preserved specimen and a perfect skeleton, both in excellent preservation, are among the riches of the Museum of the Zoological Society. A detailed account of the osteology of this animal, drawn up by Mr. Yarrell from this skeleton, will be found in the third volume of the 'Zoological Journal.' Whoever examines the skeleton of the fennec will not hesitate for a moment as to the place in nature which the animal occupies. The skull, the teeth, the feet, declare it at once to belong to the Canine group. The fennec frequents the sandy desert tracts of Nubia, and other districts of northern Africa, dwelling in burrows of its own excavation. It is said to live much on the fruit of the date, and to climb trees in order to obtain its food; this fact, if true, is very remarkable, being a marked departure from the habits and manners of the rest of the present family. Bruce, indeed, says that it builds its

nest in trees, and does not burrow in the earth ; but this statement is contradicted by M. Rüppel. The individual which Bruce had in his possession while at Algiers was fond of dates or any sweet fruit, and was also partial to eggs. He would eat bread when hungry, especially if sweetened with honey or sugar. The sight of a bird aroused him to eager watchfulness as long as it was present, and a cat was his aversion. He would endeavour to hide from the latter, and never showed a disposition to resist or defend himself. The animal was disposed to sleep by day, but as night came on became restless to excess. It was never heard to utter any sound.

The fennec is small and slightly made, with slender limbs. The length of the head and body is about thirteen inches, that of the tail eight ; the head is narrow, the muzzle pointed ; the pupil of the eye large and black, the iris deep blue ; whiskers long and thick. The ears are extremely large, as long as the head, broad at the base, erect and pointed. The fur of the body is rather short, but full and silky. The colour is uniform pale fawn or cream-colour, passing into white beneath ; the inside of the ear is fringed with long white hairs ; the whiskers are white. In the districts of Benni Mezzab and Werglah, where the date grows, the fennecs are hunted for their skins, for which, according to Bruce, there is a market at Mecca, whence they are exported to India.

In the sub-genus *Megalotis*, Cuvier associates with the fennec a species from South Africa, the *Canis Megalotis* of De Lalande (*Megalotis Lalandii*, H. Smith). This animal is somewhat less than the common fox, but comparatively higher on the limbs ; its general colour is yellowish gray, but the feet and tail, together with a stripe down the spine, are black ; the ears are large and spreading.

THE CAPE HUNTING-DOG

(*Lycaon tricolor*, Brookes). *Canis pictus*, Desmarest ; *Hyæna venatica*, Burchell.

This daring and ferocious animal, one of the pests of southern Africa, is a complete dog, or canis, in the form

of the skull and the characters of the teeth ; it has, however, as in the hyænas, only four toes on the anterior feet, and the same on the feet behind. In figure it is tall, lightly built, but muscular and well proportioned ; the limbs are long, the ears large and erect, the jaws powerful, and the teeth strong. Its aspect is wild and fierce, and its disposition treacherous. The fur is close and of a sandy yellow, irregularly elouded and blotched with black and a little white. The tail is somewhat bushy and of moderate length. The colour is subject to variation. (Fig. 23.)



23.—Cape Hunting-Dog.

Wild, fleet, and savage, this species hunts in packs, mostly during the night, but frequently in the day ; and so fleet is it, that few animals can escape. It often commits extensive ravages on the flocks and herds of the farmer, though it seldom attacks horned cattle openly, but steals on them while asleep, and bites off their tails, even at the root, with one snap, a feat which the wide

gape and vast power of its jaws enables it to do with ease. Mr. Burchell, on his return from Africa, brought a living individual to England, which retained during life all its native ferocity. The preserved skin is in the museum of the Zoological Society. A specimen in the Tower some years since arrived in company with a young Cape lion, both occupying the same den, till the lion became too strong and rough in his play, when the hunting-dog was associated with a striped hyæna and two of the spotted species, with which it agreed tolerably well.

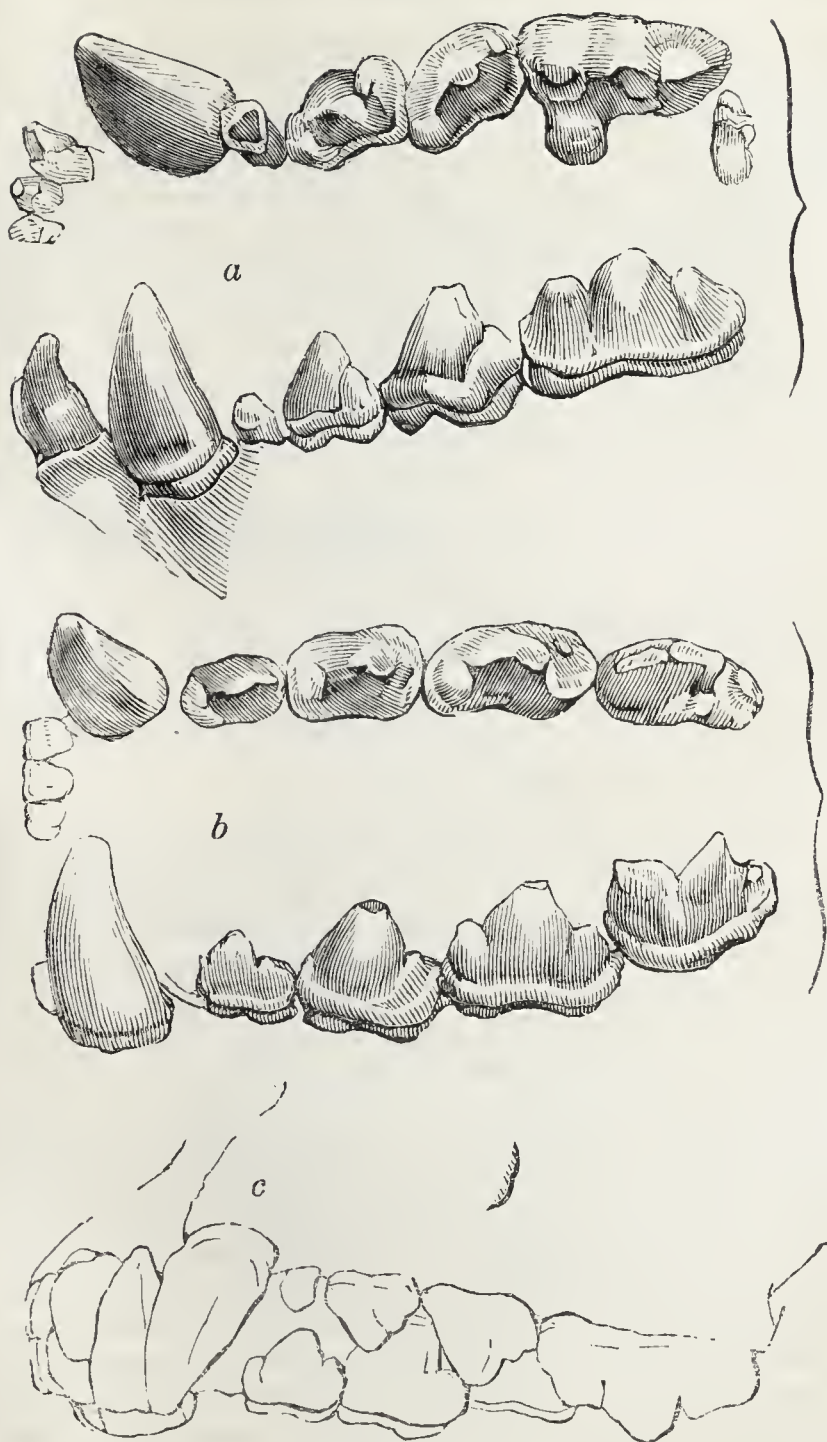
It is generally the opinion of naturalists that this species, for which the celebrated anatomist, the late Joshua Brookes, Esq., founded the genus *Lycaon*, is an intermediate link in the chain of the Carnivora, uniting the canine group to the hyænas; indeed, in some points of general aspect, and in the number of the toes, the approximation of this dog to the latter animals is so marked, that Mr. Burchell regarded it as a hyæna, and as such Temminck described it under the title of *Hyæna picta*, though he afterwards assigned it to the genus *Canis*. The name of Hyæna-dog has also been conferred upon it, but, as Mr. Swainson gives this title to the Aard-wolf (*Proteles*), we drop it altogether for the sake of avoiding confusion or misapprehension.

In size the Cape hunting-dog (Wilde Honden of the Dutch colonists) is as large as a pointer or hound, but higher on the limbs in proportion to the bulk of the body. We are not aware that any serious attempts have been made to domesticate it.



FAMILY—VIVERRIDÆ.

We are led from the Canine family through the *Lycaon*, or Hunting-dog of the Cape, to the true Hyænas, which form a section of the family *Viverridæ*, comprising the Civets, the Genets, the Ichneumons, and the Paradoxures. Destined for a life of rapine, the Viverridæ are active and vigorous: in general, the body is rather elongated, the head somewhat conical, the muzzle often acute, the eyes oblique, and the tongue



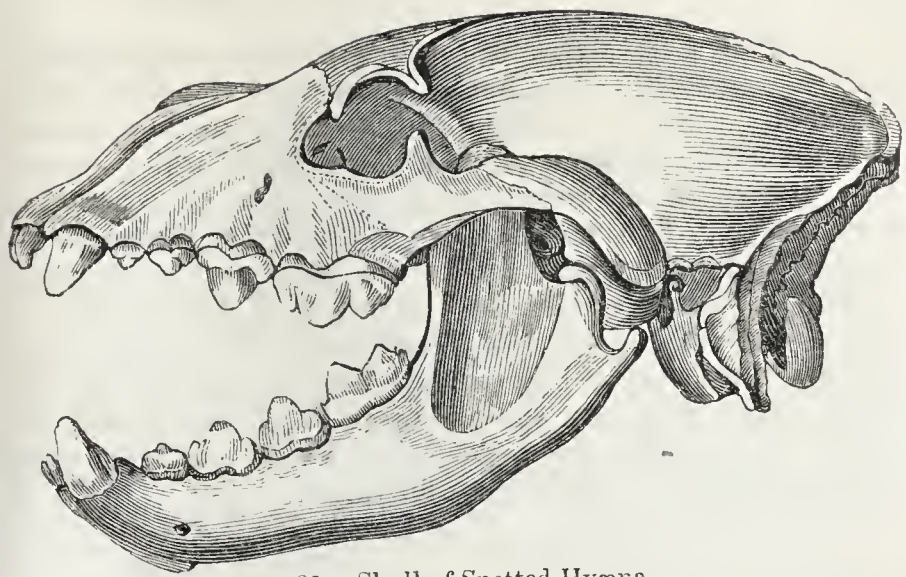
24.—Teeth of Hyæna.

rough, with retroverted horny papillæ. In most groups the feet are digitigrade; in some, semi-plantigrade. Many are remarkable for a strongly-scented musky secretion, prepared in certain glandular sacs. Nocturnal or crepuscular in their habits, they emerge from their retreats with the close of day, and begin their prowl in quest of food. Of restless, wild, and savage temper, they are by no means destitute of intelligence, and are even capable of being domesticated. The *Viverridæ* approach, through the hyæna, on one part to the Canine race; they are through other links allied to the *Ursidæ*, the *Felidæ*, and the *Mustelidæ*.

Genus *Hyæna*.

Dentition:—Incisors, $\frac{6}{6}$; canines, $\frac{1-1}{1-1}$; false molars, $\frac{3-3}{3-3}$; carnassières, or laniary molars, $\frac{1-1}{1-1}$; tubercular molars, $\frac{1-1}{0-0} = 34$.

Fig. 24 shows the dentition of the hyæna: *a*, teeth of the upper jaw in two views; *b*, those of the lower in two views; *c*, the teeth of both jaws together. Fig. 25 represents the skull of the Spotted Hyæna in profile; fig. 26, the skull of the same animal viewed from above; fig. 27, the skull of the Striped Hyæna in profile. The skull of the hyæna is remarkable for its solidity; the muzzle is short; the zygomatic arch of vast strength and thickness; and the sides of the cranium are compressed, and sweep up to a high longitudinal ridge, which projects far back from the occiput, affording space for an immense mass of the temporal muscles, which, with those of the neck, are greatly developed. According to Cuvier, the vertebræ of the neck are sometimes found to be ankylosed, or soldered together, in consequence of the violent and continual strain to which they are subject, and hence probably arose the belief that these vertebræ in the hyæna were one solid piece.



25.—Skull of Spotted Hyæna.



26.—Skull of Spotted Hyæna.

In the port and figure of the hyæna there is something very remarkable. The neck, chest, and shoulders are amazingly robust, but the hind quarters are low, from the crouching posture of the hind legs, which may be termed knock-kneed, the heel-joints approaching each other. The movements of these limbs are of a dragging character, influencing the pace of the animal, which, though rapid, is a sort of awkward shuffle. The toes are four on each foot, furnished with blunt, stout, unretractile claws. The ears are large and erect; a full mane runs down the spine; there is a deep glandular subcaudal pouch; the pupil is somewhat oblong; the tongue rough; the habits are nocturnal.



27.—Skull of Striped Hyæna.

The hyænas were not separated by Linnæus from the genus *Canis*, but subsequent naturalists have placed them in various groups according to their views of affinity. We believe them to form a group of the *Viverridæ*.

Three distinct species are known.



28.—Striped Hyæna.

THE STRIPED HYÆNA

(*Hyæna vulgaris*, Desm.). *Hyæna striata*, Zimmerman ;
H. orientalis, Tiedem. ; *H. antiquorum*, Temm. ; *Canis*
Hyæna, Linn.

This species is a native of Asia, and of northern and central Africa. (Fig. 28.) It is found in the Caucasian and Altaic mountains, in Asiatic Turkey, in Syria, Turkey, Persia, India ; and in Barbary, Arabia, Egypt, Nubia, Abyssinia, Soudan, Senegambia, &c.

We may here premise, that much of what relates to the striped hyæna, so extensively spread, applies equally to the other species, which appear to be confined exclusively to South Africa. They are all destined to fill an important station in the economy of nature. It is their part, with vultures and other foul-feeding creatures, to cleanse the earth of putrescent animal matters, and

especially of the decaying carcasses of the larger beasts, whose remains, if not speedily removed, would infect the atmosphere with pestilential effluvia. They are Nature's scavengers, and assiduously do they labour in their vocation: they clear the battle-field of the victims of barbarous warfare, gorging on the bodies of the slain; they disinter the dead from the lightly-covered grave; they ransack towns and villages in search of offal; they prowl about the fields, and around the enclosures of human dwellings. The carrion which chance throws in their way furnishes a luxurious meal, nor are the strongest bones unacceptable—such is the power of their jaws, that they crunch the thigh-bone of an ox, for the sake of the marrow it encloses.

Carrion and dead bodies, however, are not their only food; they prey upon horses, sheep, and cattle, often committing extensive depredations; nor are human beings safe from their murderous assaults. They seldom, indeed, attack man openly, and usually avoid a contest with him; but, when driven to self-defence, they turn furiously upon their assailant, and combat with determined obstinacy. On the contrary, the sleeping man, woman, or child, whom they chance to discover in their nightly prowl, almost certainly falls a victim. Their haunts by day are dens and caves, gloomy rocks, and the ruins of towns and sepulchral monuments of antiquity; there the “fell hyæna” rears her brood. As darkness sets in, these fierce beasts emerge from their lair, and, menacing with teeth displayed and glaring eyes, warn the intruder to a timely retreat.

In some districts the striped hyæna is fearfully numerous. Bruce records that in Abyssinia they were the scourge of the country “both in the city and the field, and appeared to surpass the sheep in number. From evening till dawn of day the town of Gondar was full of them: here they sought the different pieces of slaughtered carcasses which were exposed in the streets without burial. Many a time in the night, when kept late in the palace, on going across the square from the king's house, I have been apprehensive lest they should

bite me in the leg. They grunted in great numbers around me, although I was surrounded by several armed men, who seldom passed a night without wounding or slaughtering some of them. One night I went out of my tent, and returning immediately, I perceived two blue eyes glaring at me in the dark ; I called my servant to bring a light, and we found a hyæna standing near the head of the bed, with two or three large bunches of candles in his mouth, by keeping which, he seemed to wish at that time no other prey. I was not afraid of him, but with a pike struck as near the heart as I could. It was not until I had done this, that he showed any signs of fierceness ; but upon feeling his wound he dropped the candles and endeavoured to run upon the shaft of the spear to arrive at me ; so that I was obliged to draw a pistol from my girdle and shoot him, and nearly at the same time my servant cleft his skull with a battle-axe. In a word, the hyænas were the plague of our lives, the terror of our midnight walks, and the destruction of our mules and asses, which are their favourite food." Major Denham gives a similar account. At Kauka, he says, the hyænas are " everywhere in legions, and grew now so extremely ravenous, that a good large village where I sometimes procured a draught of sour milk on my duck-shooting excursions had been attacked the night before my last visit, and the town absolutely carried by storm, notwithstanding defences, of nearly six feet high, of branches of the prickly trilloh, and two donkeys, whose flesh these animals are particularly fond of, carried off in spite of the efforts of the people."

Few animals have been the subjects of more false and superstitious opinions, both in ancient and modern times, than the hyæna. Among the writers of antiquity, however, Aristotle accurately describes it, and even explains the popular error current in his day, as it has been since, respecting the bi-sexual character of the animal ; an error in which Pliny seems to acquiesce, though he alludes to Aristotle's contradiction of it ; but it is evident that he knew nothing himself of the true history of the animal, for, as Cuvier has observed, the Romans were not really

acquainted with the animal till at a comparatively late period. Gordian III. is the first, and apparently the only one, of the emperors who imported it; he had ten which were exhibited in the games of Philip, in the year of Rome 1000, or A.D. 247. It is not, in fact, until within the last few years, comparatively speaking, that the moderns have recognised the true hyæna. Belon, who wrote in 1553-4-5, &c., mistook the civet for it, which animal indeed resembles the hyæna in having scent-pouches, a mane, and a transversely barred or waved style of colouring; yet at the same time that he fell into this error, he was in possession of a good figure of the true hyæna, but, without suspecting the real fact, he gives this under the title of Sea-Wolf, and describes it as an animal from the coasts of England. From the time of Belon to that of Buffon, no naturalist figured the hyæna from nature; and it is only within the last few years that its real character has been understood. (Fig. 29.)



29.—Striped Hyæna.

The hyæna has been represented as ferociously untameable: nothing can be more untrue; it is easily domesticated. Bishop Heber saw one in India that followed

its master and fawned on him like a dog. Barrow, speaking of the South African Spotted Hyæna, states that in the district of Schneuberg it is domesticated, and used like a hound for the chase. Colonel Sykes kept a young hyæna tame in India, and brought the animal over to England; he presented it (then full grown, yet gentle as a dog) to the Zoological Society. "In India," says Colonel Sykes, "it was allowed to run about my house, and on board ship it was released from its cage two or three times a day, to play with the sailors and gambol with the dogs. It early recognised my person and voice, would obey when called, and in general was as playful and good-humoured as a puppy. My visits to it in the Gardens have been rare and at long intervals, nor have I ever carried it food. I anticipated, therefore, that it would outgrow its early affection, and that I should be to it as any other stranger; but it has always greeted me not only as an old acquaintance, but as an old friend; and if I am to judge from its agitation and peculiar cries, the animal's recognition is that of affection. On Sunday last it was asleep in its cage when I approached. On calling it by its name it looked up, distinguished me in the crowd, started on its legs, and on my applying my hand to its mouth to smell to, it threw itself down against the bars, rubbed its head, neck, and back against my hand, and then started on its legs, and bounded about its cage uttering short cries. On ceasing to speak to it and moving away, it looked wistfully after me, nor resumed its motions till I addressed it again. Its manifestations of joy were so unequivocal as to excite the surprise of a great number of bystanders." ('Zool. Proceeds.,' 1833, p. 76.)

THE SPOTTED HYÆNA

(*Hyæna crocuta*). Tiger-Wolf of the colonists at the Cape;
Hyæna Capensis, Desm.; *H. maculata*, Thunberg.

This species (Fig. 30) is the nuisance and even terror of South Africa, where it is well known to the farmers, who too often experience the effects of its destructive habits;



30.— Spotted Hyæna.

for it not only devours the carrion which chance throws in its way, but it invades the farmers' pens or folds during the night, and often succeeds in killing or mutilating such of the larger kinds of live stock as have not been secured before dusk. Sickly animals, as we are assured, are less liable to suffer from the voracity of this creature than those which are in full health: the latter by their rapid flight inspiring the enemy with a courage of which by nature he is destitute; whereas the sickly face him, and thus intimidate him. So anxious is he for the flight of animals as a preliminary to his attack, that he uses all the grimace and threatening he can command, to induce them to run, and never dares to attack them unless they do so. The spotted hyæna seldom moves abroad during the day; night is his season of activity, and towards nightfall his howlings are regularly heard, announcing to the various animals that their foe is on his prowl. (Fig. 31.) These dismal sounds appal the timid; and as

they are heard on every side around, confuse the affrighted fugitive, who often runs into the danger from which he seeks to escape. Formerly hyænas were in the habit of paying nightly visits to the streets of Cape Town, and even now occasionally approach the town, and their howlings are often heard from the Table Mountain. In the Caffre country they are numerous and daring, approaching the villages, and attempting, either by force or stratagem, to pass the wattles by which the houses are defended. If so far successful, they next attempt to enter the houses, and not unfrequently succeed in carrying off a young child of the family.



31.—Spotted Hyæna.

Mr. Steedman, in his 'Wanderings and Adventures in the Interior of Southern Africa,' gives most appalling accounts of the rapacity of the spotted hyæna. He states that Mr. Shepstone, in a letter from Mamboland, relates that the nightly attacks of wolves, as the hyænas are generally called, have been very destructive amongst the children and youth; for within a few months not fewer than forty instances came to his knowledge wherein that beast had made a most dreadful havoc. "To show clearly," says that gentleman, "the preference of the wolf (spotted hyæna) for human flesh, it will be necessary to notice that when the Mambookies build their houses,

which are in form like beehives, and tolerably large, often eighteen or twenty feet in diameter, the floor is raised at the higher or back part of the house, until within three or four feet of the front, where it suddenly terminates, leaving an area from thence to the wall, in which every night the calves are tied to protect them from the storms or wild beasts. Now it would be natural to suppose, that should the wolf enter, he would seize the first object for his prey, especially as the natives always lie with the fire at their feet; but, notwithstanding this, the constant practice of this animal has been in every instance to pass by the calves in the area, and even by the fire, and take the children from under the mother's kaross, and this in such a gentle and cautious manner, that the poor parent has been unconscious of her loss until the cries of her little innocent have reached her from without, when a close prisoner in the jaws of the monster." Mr. Shepstone then particularises two instances within his own knowledge, one of a boy about ten years of age, and the other of a girl about eight, who had been carried off by this species, and wretchedly mangled, but recovered by the attention of Mr. Shepstone and his friends.

Various methods are employed for the destruction of this ferocious beast, as snares, pit-falls, traps, spring-guns, &c., but so cunning and suspicious is the animal, that he mostly avoids them.

The general colour of this species is yellowish-brown, with numerous spots, more or less distinct, of a deeper tint. The mane down the neck and back is less full and long than in the striped hyæna, and the hair generally shorter.

THE VILLOSE HYÆNA

(*Hyæna villosa*, Smith). Straand-Wolf of the Dutch colonists of the Cape.

For our knowledge of this species, which resembles in some respects the Striped Hyæna, we are indebted to Dr. A. Smith, who figured and described it in the



32.—Villose Hyæna.

fifteenth volume of the 'Linnean Transactions.' (Fig. 32.) The Villose Hyæna is a native of South Africa, but is by no means so common as the spotted species, and is found chiefly along the sea-coast, but has been observed in the neighbourhood of Nieuveld Mountains, a considerable distance in the interior of the country. The Villose Hyæna, or Straand-Wolf, devours carrion, and such dead animal substances (whales for instance) as the sea casts up; but when pressed by hunger its habits seem to resemble those of the other species, for it then commits serious depredations on the flocks and herds of the colonists, who hold its incursions in great dread. Mr. Steedman, who states this, says that he saw a very fine specimen, which had been shot by a farmer residing in the vicinity of Blauwberg, and was informed that it had destroyed three large calves belonging to the farmer. He adds, that it is said to be a remarkably cunning ani-

mal, retiring to a considerable distance from the scene of its depredations to elude pursuit, and concealing itself during the day-time in the mountains, or in the thick bush which extends in large patches throughout the sandy district in which it is usually found.

The Villose Hyæna stands about two feet four inches in height at the shoulder, and measures four feet four inches from the nose to the root of the tail. The hair of the body is long and coarse. Its general colour is dusky-gray, variegated with indefinite clouds or oblique bands of black, the latter prevailing on the limbs.

The fossil-bones of extinct species of hyæna prove the abundance of these animals at one period in our portion of the globe. In the Cave of Kirkdale these relics were found in vast numbers, exceeding those of any other carnivorous animal. They have been discovered also in other places in our island. On the Continent they occur in the Cavern of Gaylenreuth, and in most of those where the fossil-bones of bears are met with, to which we have already alluded.

THE PROTELES

(*Proteles cristata*). Aard-Wolf (earth-wolf) of the Dutch colonists of the Cape; *Proteles Lalandii*, Isidore, Geoffroy; *Viverra Hyænoïdes*, Desmarest; *Civette Hyénoïde* of F. Cuvier.

The genus *Proteles*, which appears to link the Hyænas to the Civets, contains, as far as known, only one species, which is a native of South Africa. In general contour and manners this singular animal much resembles the former animals, but is of inferior size. The hinder quarters are low and trailing; the shoulders thick and muscular; while a full coarse mane runs along the spine. (Fig. 33.) In dentition it is very remarkable. The

molars are $\frac{4-4}{3-3}$, much separated from each other. Of those above, the first three are false, and the fourth is small and tuberculous, with three points. The three

molars below have each the character of false molars. Incisors and canines as usual.

On their fore-feet there are five toes, but the thumb is short, rudimentary, and high on the carpus, as in the dog ; the hinder-feet have four toes. The claws are strong, large, blunt, and well adapted for scratching. There are no decided scent-pouches, as in the Civets, but a furrow in their stead. The form of the head more resembles that of the Civets than the Hyænas, being somewhat elongated, and having the muzzle conical and pointed. The ears are long, erect, acute, and thinly covered with



33.—Proteles, or Aard-Wolf.

hair ; the whiskers are strong : the tail is short and bushy, with coarse hair. The body is covered with woolly fur, intermixed with long coarse hairs. The general colour is of a yellowish-gray, radiated with distinct transverse stripes of dusky-black, the mane being waved with black, which is also the colour of the feet and extreme half of the tail. The young are much darker, both in general colour and their markings, than adults. Length of an adult female specimen in the Muscum of the Zoological

Society, two feet six inches, exclusive of the tail, which is eleven inches. The male is somewhat larger.

The Aard-Wolf, or *Proteles*, is nocturnal in its habits, and constructs a deep burrow, at the bottom of which it lies concealed during the day-time. This subterranean chamber, to which there are three or four different entrances, is usually occupied by several individuals, so that the animal appears to be partially gregarious. Notwithstanding the trailing contour of its hind-quarters, it runs with considerable quickness: when irritated, it erects its mane, like the hyæna. Its food consists of carrion and small animals, not excluding ants, which were found by Sparrman in the stomach of one he killed.

THE CIVET (*Viverra Civetta*).

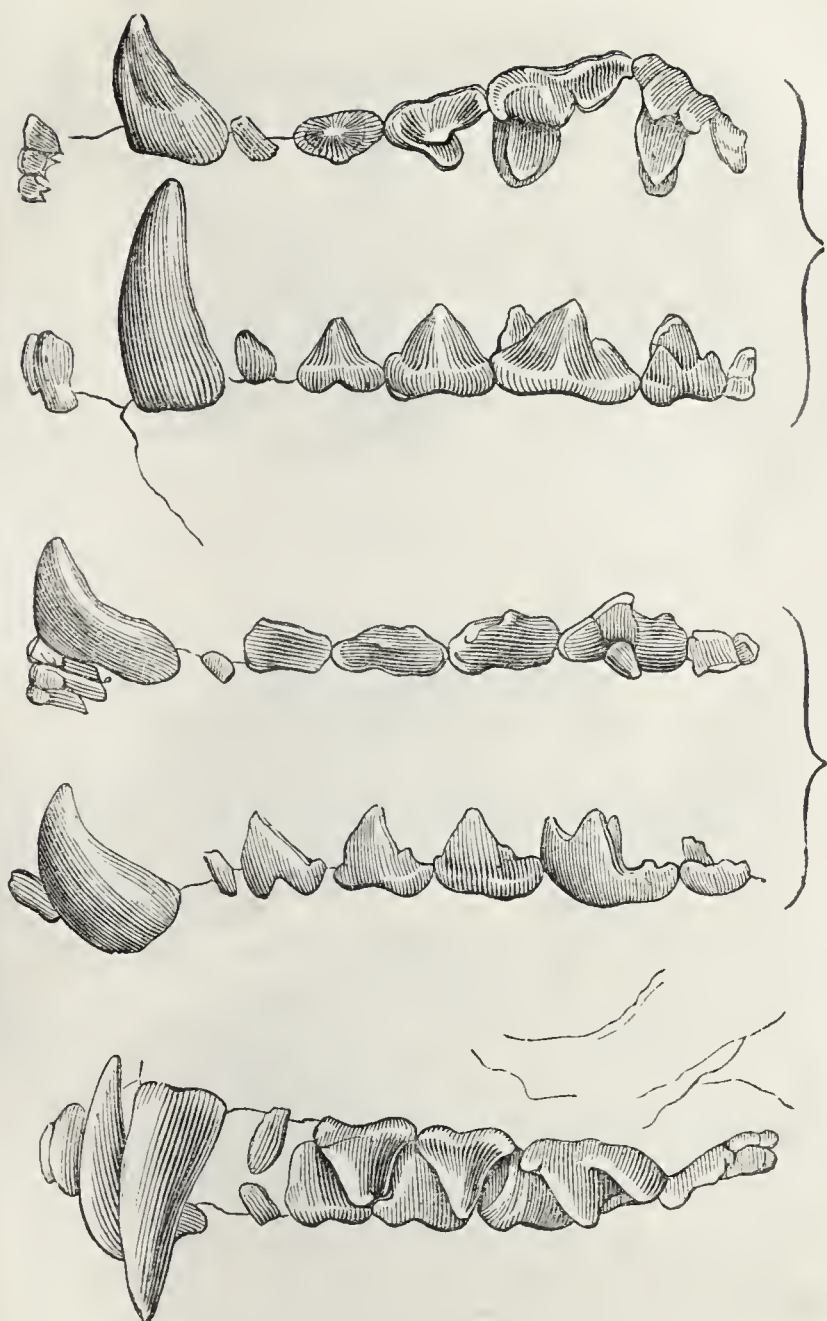
The restricted genus *Viverra*, as established by modern naturalists, contains only a limited number of species, characterized by the possession of a large double sacculus, secreting an unctuous substance of a strong musky odour; by the claws being half-retractile; and the pupil of the eye circular during the day. The dentition, similar to that of the *Ichneumons* (Fig. 34), is as follows:—

$$\text{Incisors, } \frac{6}{6}; \text{ canines, } \frac{1-1}{1-1}; \text{ molars, } \frac{6-6}{6-6}, = 40.$$

The body is long and compressed laterally; the fur is somewhat harsh, full; and a mane, as in the *Proteles*, runs along the spine. The head is stout, but the muzzle is elongated; the ears are short, wide, and rounded; the tail is shorter than the body. The eyes gleam in the dark with great brilliancy.

Of nocturnal habits, wild and savage, the animals of this genus are decidedly carnivorous, preying upon birds, reptiles, and small mammalia, which they take by surprise, and exhibit great energy and bodily activity. When taken young they are easily tamed, but adults can never be reconciled to captivity.

The Civet is peculiar to North Africa, and is especially common in Abyssinia, frequenting hilly uncultivated districts and arid situations. It gives its name to the musky



34.—Teeth of Ichneumon.



35.—Civet.



36.—Civets.

perfume for which all the species are equally remarkable. In figure the civet is robust, but the body is compressed laterally ; in size it equals a dog of middle stature, being about twenty-six inches in length, exclusive of the tail, which is thirteen or fourteen inches. (Fig. 35.) Buffon states that in his time numbers were kept in Holland for the commercial advantage of obtaining their odorous secretion ; but we are not aware that such is now the case. In North Africa, however, the practice is in vogue. The colour of the civet is dark gray, thickly banded with black ; a white stripe runs along the sides of the neck, bounded by a black line above, the throat and sides of the muzzle being black. A thick mane of coarse black hair runs along the neck and back, and continues over the tail, which is consequently somewhat bushy. (Fig. 36.)

In India the Civet is represented by the Zibet (*Viverra Zibetha*, Linn. ; *Viverra undulata*, Gray), and in Java by the Tangalung (the Tangalunga Padi of the natives). This is the Spotted Civet, *Viverra Tangalunga* of Gray, and the *V. Zibetha* of F. Cuvier, Dr. Horsfield, Sir T. Raffles, who confounded it with the former, from which it is decidedly distinct. It is the *Viverra Hardwickii* of Lesson.

THE GENET (*Genetta vulgaris*).

The Genets are distinguished by a slim and graceful contour ; the neck is long ; the head is narrow, and terminates in a pointed muzzle ; the limbs are short ; the ears broad, short, and rounded ; the tail lengthened ; the pupils of the eyes linear and vertical ; the musk-pouches are inconsiderable or reduced to a mere depression. (Fig. 37.)

In their manners, as well as in several anatomical peculiarities, the Genets approximate closely to the Cats. Like those animals, they hiss when approached or irritated ; spring upon their prey, taking it by surprise ; strike and lacerate with their talons, which are completely retractile ; and climb trees with ease and rapidity. In the markings and character of the fur also we see a marked approach to the cats.



37.—Genet.

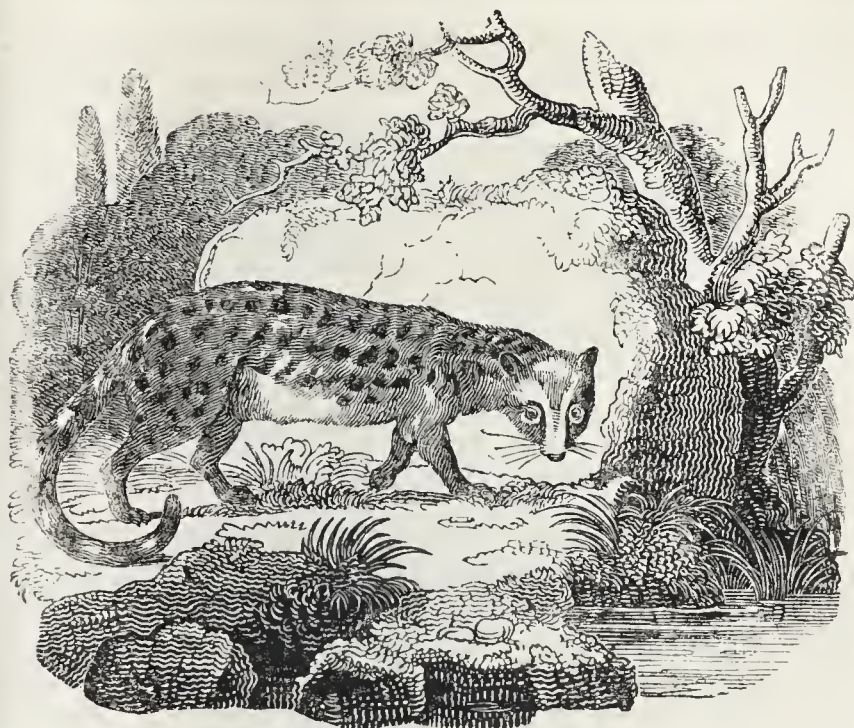
The Common Genet is found throughout Africa, and occurs in the South of France and other portions of Europe adjacent to the Mediterranean. It is said to haunt the borders of streams and rivers, especially near their source. (Fig. 38.) This beautiful but fierce animal is easily domesticated, and is kept tame in Constantinople, where it is in repute as a destroyer of rats and mice. Its odour is not very powerful, nor at all disagreeable.

The general colour is grayish-yellow, with black lines down the back, and spotted on the sides with the same; on the cheeks, above the eyes, and on each side of the muzzle, there is a streak of white; the tail is alternately banded with black and white.

THE RASSE GENET (*Genetta Rasse*).

Viverra Rasse, Horsfield; *Viverra Gunda*, Hamilton, MSS.

This species, which is a native of Java, appears to be a different one from the *Genetta Indica*. According



38.—Genet.



39.—Rasse Genet.

to Dr. Horsfield, it frequents forests of moderate elevation, where it preys upon small birds and animals of every description, and possesses the sanguinary appetite of the animals of this family in a high degree. (Fig. 39.) In confinement it will devour a mixed diet, and is fed on eggs, fish, flesh, and rice. The natives affirm that salt is a poison to it. Its odoriferous secretion is termed *dedes* by the Javanese, and *jibet* by the Malays, and is held in high esteem. In the Museum of the Zool. Soc. there are eight distinct species of the present genus, to which has yet to be added the Fossane of Madagascar.

THE DELUNDUNG (*Prionodon gracilis*).

This beautiful and singular species, a native of Java, was regarded by Dr. Horsfield as so intimately related to the Cats, that he terms it *Felis*, and assigns it a sectional place in that group. We consider it to be the most nearly allied to the Genets, though destitute of scent-glands, and differing somewhat in the dentition, which is as follows:—Incisors, $\frac{6}{6}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{5-5}{6-6}$:

Of the molars above, the first is bicuspid, the second tricuspid, as is the third; the fourth, or carnassière, has an elongated cutting edge; the fifth is tubercular. This jagged form of the teeth has suggested the name of *Prionodon*, from *πρίων* 'a saw,' and *ὀδὸν* 'a tooth.' (Fig. 40: *a*, an external view of the teeth of both jaws; *b*, an internal view of the same; *c*, front view of the teeth.) The Delundung was discovered in 1806, by Dr. Horsfield, during his researches in the district of Blambangan, at the eastern extremity of Java, where it is very rare, and still more so in other parts of the island: it inhabits the extensive forests with which the district is almost entirely covered. Of its habits no details were collected. (Fig. 41.)

This animal is extremely slender and elongated, with a tapering head and sharp muzzle, a long thick tail, and slender delicate limbs. The eyes are sprightly, the irides brown, the pupils circular. The claws are minute



40.—Head, Teeth, and Feet of Delundung.

and sharp, and perfectly retractile. The fur is silky at the base, and soft to the touch. The whiskers are very long. The ground-colour is of a delicate yellowish-white : four broad transverse bands of rich blackish-



41.—Delundung.

brown traverse the back at equal intervals ; an interrupted stripe, originating behind the eye and between the ears, passes along the side, and terminates in large spots on the thigh ; the shoulder is similarly spotted ; and the tail is ringed at regular but increasing intervals. The *toute ensemble* brings to mind the cloudings on a rich piece of tortoiseshell. Fig. 40 presents a front view of the head : *d*, the fore-foot covered with fur ; *e*, the hind-foot with the fur removed.

THE CRYPTOPROCTA (*Cryptoprocta ferox*).

This remarkable and rare animal is a decided link between the Viverrine and the Feline groups, approach-

ing very nearly to the latter in external characters, and still more so in internal anatomy.

The body is slender, but the limbs are robust and muscular; the head is narrow; the eyes rather small; the ears unusually large and rounded; the toes five on each foot; the tail long. General colour a light brownish-red. (Fig. 42.)



42.—Cryptoprocta.

The individual on which Mr. Bennett founded his description was immature, having not yet lost its milk-teeth; it was thirteen inches and a half in the length of the head and body, that of the tail being eleven inches and a half.

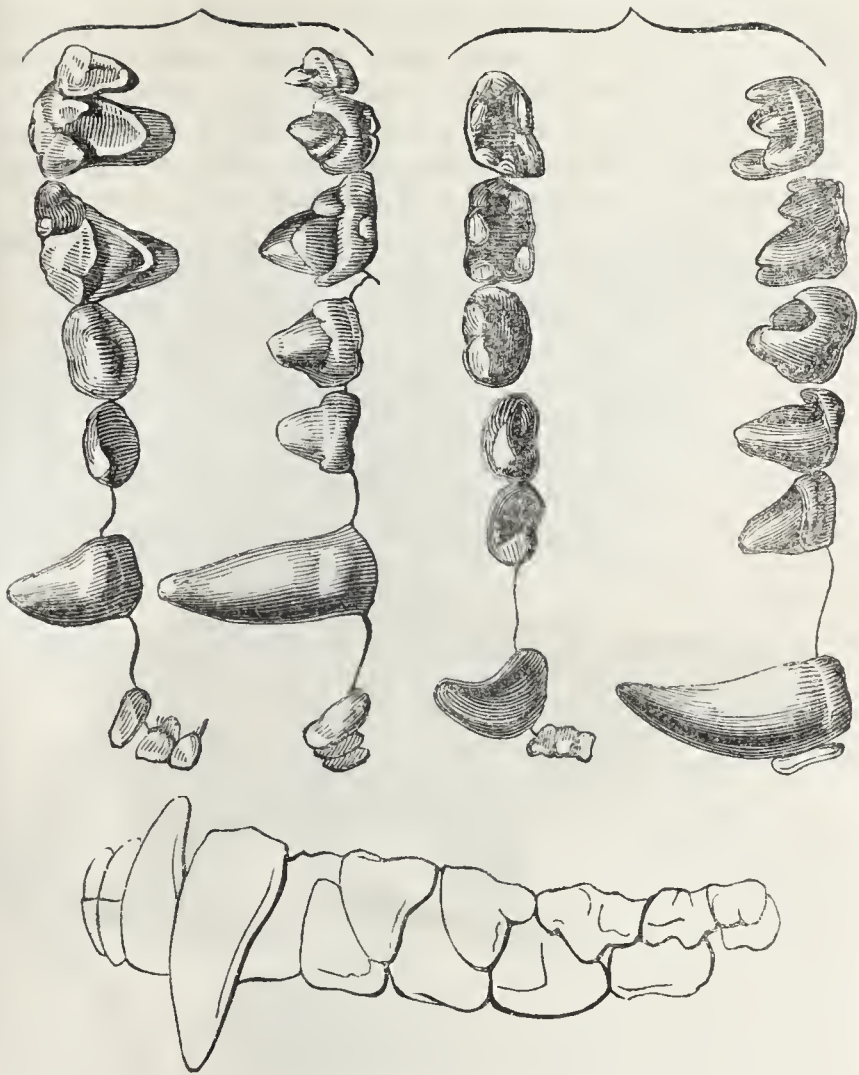
Of the habits of the *Cryptoprocta ferox* nothing definite is known. The specimen in question was sent

to the Zool. Soc. by Mr. Telfair, President of the Mauritius Natural History Society, who states that he received it alive from the interior and southern part of Madagascar, and that he had not seen in the Mauritius any of the Madagascar people that were acquainted with it. Hence it would seem to be rare. He remarks, "It was the most savage creature of its size I ever met with; its motions, power, and activity were those of a tiger, and it had the same appetite for blood and the destruction of animal life. Its muscular force was very great, and the muscles of the limbs were remarkably full and thick."

THE SURICATE (*Ryzæna tetradactyla*, Ill.).

Regarding the Proteles as leading to the Hyænas, and the Cryptoprocta to the Cats, another line of the Viverridæ appears to conduct us to the Ferrets, through the Ichneumons. But before we notice these, two remarkable genera claim our attention, each containing a single species, which in form and habits appears to exhibit a certain degree of affinity to the Racoons, having, like those animals, a long, pointed, movable nose; feet almost entirely plantigrade; eyes obliquely set; the body strongly built; and the habit of sitting up on the haunches, while the fore-paws are employed in holding food. While, however, the approach of these species to the Racoons is discernible, their alliance to the Ichneumons cannot be mistaken. We first select the Suricate. A nose remarkably long, sharp, and flexible; quick, lively, oblique eyes, with circular pupils; and close ears, give a peculiar expression to the physiognomy of the Suricate. The toes on each foot are four, those of the anterior limbs being armed with large hooked claws, miniature copies of those of the Sun-bears. The dentition (Fig. 43) resembles that of the ichneumons, except that there is one false molar less on each side, above and below.

This rare animal is a native of Southern Africa, and is eminently carnivorous in its habits. Its length is about a foot, exclusive of the tail, which is nearly six



43.—Teeth of Suricate.

inches. There are two scent-glands. The general colour is yellowish-gray, waved transversely with dark brown and rufous, the hairs, as in the ichneumons, being ringed with different tints; the tail is rufous-brown, ending in black. The fur is long and rather coarse. (Fig. 44.)

We have had an opportunity of observing two specimens, a male and female, in captivity; they were

lively, inquisitive, and docile, but betrayed great excitement when birds or other small animals were presented before their cage, endeavouring to seize or dart upon them. They used their paws with much address, and would sit up, peeping between the wires, or caressing each other, for they exhibited great mutual attachment.

The female died first; the male became dull, pined, and shortly followed his companion. The notes of their anatomy, by Professor Owen, are given in the 'Zoological Proceedings' for 1830-31.



44.—Suricate.

THE MANGUE (*Crossarchus obscurus*).

The Mangué, the only known representative of the genus *Crossarchus*, is a native of Sierra Leone and other parts of Western Africa. It resembles the Suricate in the form of the head and nose, in dentition, and general structure, internal as well as external. It



45.—Mangue.

has, however, five toes on each foot, and is fairly plantigrade. Its general colour is deep chocolate-brown, grizzled with yellowish-white, each hair being ringed with this colour. (Fig. 45.) The individual which we have observed in captivity resembled the Suricate in its habits, and was very intelligent. With respect to its manners in a state of nature we have no particular details. In the 'Zool. Proceeds.' for 1834 will be found an account of the internal anatomy of this animal, compared with that of the Suricate and the Viverridæ in general.

THE EGYPTIAN ICHNEUMON

(*Herpestes Pharaonis*, Desm.)

With long agile bodies, small glowing eyes, a pointed nose, long tail, short limbs, and semi-plantigrade feet, the Ichneumons, or Mangoustes, as they are also called

(*Mangusta*, Oliv. ; *Ichneumon*, Geoff. ; *Herpestes*, Illig.), in their general form, no less than in their habits, display a certain approximation to the ferrets, being bold, active, and sanguinary, and unrelenting destroyers of birds, reptiles, and small mammalia, which they take by surprise, darting rapidly upon them. Beautiful, cleanly, and easily domesticated, they are often kept tame in the countries they naturally inhabit, for the purpose of clearing the houses of vermin, though the poultry-yard is not safe from their incursions. The ears are short, wide, and rounded ; the hair long, rather coarse, and waved or grizzled, each hair being ringed with different tints ; the scent-gland is large ; the feet are five-toed, the nails sharp and semi-retractile ; the pupils of the eyes oblong : Fig. 34 gives the dentition. The ichneumons are natives of the hotter parts of the Old World, the species being respectively African and Indian. Night is their season of activity ; they then prowl in quest of their prey, stealing along with noiseless step, urged by hunger and the instinct of destruction. The Egyptian ichneumon is a native of North Africa, and was deified for its services by the ancient Egyptians. Its Coptic name is Nems ; its Arabic, among the Moors, Serro. Snakes, lizards, birds, crocodiles newly hatched, and especially the eggs of the crocodile, constitute its food ; and the ancients believed that it attacked and killed that huge reptile when fully grown. Pliny states that when gorged with food, and lying with the mouth open, a little bird, called *Trochilos*, enters the jaws of the crocodile to pick the teeth, to the great satisfaction of the monster ; and he adds, that the ichneumon spying him asleep, darts down his throat and tears his inside. We need not enter into any grave refutation of this marvellous account.

The ichneumon is fierce and daring, and glides with sparkling eyes towards its prey, which it follows with snake-like progression ; often it watches patiently for hours together in one spot, waiting the appearance of a mouse, rat, or snake from its lurking-place. We have frequently seen the animal sit up like the *Suricate* while

feeding. In a state of domestication it is gentle and affectionate, and never wanders from the house or returns to an independent existence; but it makes itself familiar with every part of the premises, exploring every hole and corner, inquisitively peeping into boxes and vessels of all kinds, and watching every movement or operation. Sonnini, who travelled in 1777-8-9, observes that few or none are now reared in Egypt in a state of domestication; Hasselquist, however, mentions that Mr. Barton, English Consul in Egypt, had a tame ichneumon, and adds that it frequently goes about the houses like a cat. It would appear that, like the polecat, it often depopulates the fowl-roost.

The colour of the Egyptian ichneumon is brownish-gray, each hair being ringed with white and dark tints of brown; the tail tapers towards the extremity, which is tufted and black. Length twenty-one inches, exclusive of the tail, which is eighteen.



46.—Indian Ichneumons.

THE INDIAN ICHNEUMON (*Herpestes griseus*).

This species is much less than the Egyptian ichneumon, and of a beautiful freckled-gray. (Fig. 46.) It is common in India, and frequently brought to this country; it is easily tamed, and is inquisitive, active, cleanly, and docile. Mr. Bennett, in his account of one kept in the Tower, says that on one occasion it killed no fewer than a dozen full-grown rats, which were turned out before it in a room sixteen feet square, in less than a minute and a half.



47.—Garangan.

THE GARANGAN (*Herpestes Javanicus*).

According to Dr. Horsfield, this species, termed Garangan by the Javanese, inhabits chiefly the large teak-forests, and its agility is greatly admired by the natives: it attacks and kills serpents with excessive boldness. "It is very expert in burrowing in the ground, which process it employs ingeniously in the

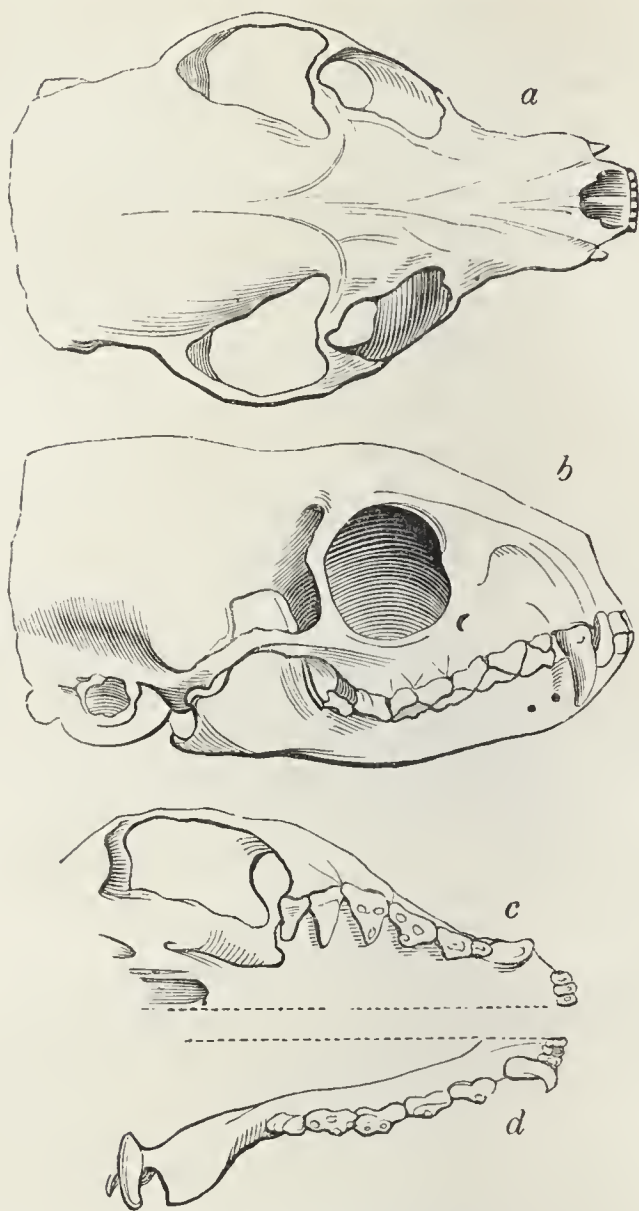
pursuit of rats. It possesses great natural sagacity, and, from the peculiarities of its character, it willingly seeks the protection of man. It is easily tamed, and in its domestic state is docile, and attached to its master, whom it follows like a dog; it is fond of caresses, and frequently places itself erect on its hind-legs, regarding everything that passes with great attention. It is of a very restless disposition, and always carries its food to the most retired place to consume it. It is very cleanly in its habits; it is exclusively carnivorous, and very destructive to poultry, employing great artifice in surprising chickens:" hence the natives seldom keep it tamed, nor is it altogether to be trusted, as it is subject to fits of excessive violence. (Fig. 47.) Its mode of encountering serpents was related by the natives to Dr. Horsfield, exactly as it is described by Rumphius, who informs us that the Javanese nobles amuse themselves with these contests. When the two enemies are opposed to each other, the serpent endeavours to twine round the quadruped and kill it; the latter inflates itself to turgescence, and, as the reptile is about to inflict the fatal wounds, contracts its body, slips through the scaly coil, and seizes its foe by the neck. We suspect that in this story some allowance must be made for over-colouring.

STEEDMAN'S CYNICTIS

(*Cynictis Steedmannii*, Ogilb.).

The genus *Cynictis* differs from *Herpestes* in the number of the toes on the hind-feet being only four, and in the absence of a false molar on the lower jaw. The tail is long and bushy. The characters of the skull and dentition are seen at Fig. 48: *a*, the skull from above; *b*, the same in profile; *c*, the dentition of the upper jaw; *d*, the dentition of the lower jaw.

The *Cynictis Steedmannii* is a native of South Africa, and appears to resemble the ichneumons in its general habits. It excavates burrows in which it dwells. Though only introduced to our knowledge within the last few years, it was most probably seen by Sparrman and Barrow, the

48.—Skull and Teeth of *Cynictis*.

latter of whom describes an animal so closely resembling the present, that there can be no doubt as to their identity. The general colour is foxy-red ; the tail is bushy, tipped with white. Length one foot six inches, exclusive of the

tail, which is one foot. (Fig. 49.) A second species of this genus, *Cynictis melanurus*, is a native of Sierra Leone; and several others have been lately discovered in South Africa.



49.—Steedman's Cynictis.

THE COMMON PARADOXURE

(*Paradoxurus Typus*).

The genus *Paradoxurus* appears to be one of the links which conduct us from the true *Viverræ* to the aberrant forms of the *Ursidæ*. This genus is peculiar to India and the adjacent islands. It is characterized by a semi-plantigrade condition of the feet, the greater portion of the sole being naked and callous; the toes five, closely united together by intervening webs; claws short, sharp, and semi-retractile; the pupil linear; a mere fold instead

of scent-pouches; molars $\frac{6-6}{6-6}$; nearly resembling those

of the *Genets*; the tail frequently spirally contorted, but not prehensile; the fur full.

In size the Paradoxure exceeds a common cat, its total length, including the tail, being three feet. The general colour is grayish-black tinged with yellow, and indistinctly banded and spotted with a dusky hue; a whitish streak occupies the cheek below the eye, and another runs above; muzzle black. (Fig. 50.) The Paradoxures are to a great extent frugivorous, and are in the habit of climbing trees, which they do with great facility. Dr. Horsfield, in his 'Zoological Researches,' gives a description of the *Java paradoxure*, or Musang, well worthy of notice. Its manners, he observes, are very similar to those of the Genet. "If taken young, it becomes patient and gentle during confinement, and receives readily animal and vegetable food. It requires little attention, and contents itself with the scanty remains of the meals of the natives, with fish, eggs, rice, potatoes, &c., the structure of its teeth being particularly adapted to vegetable



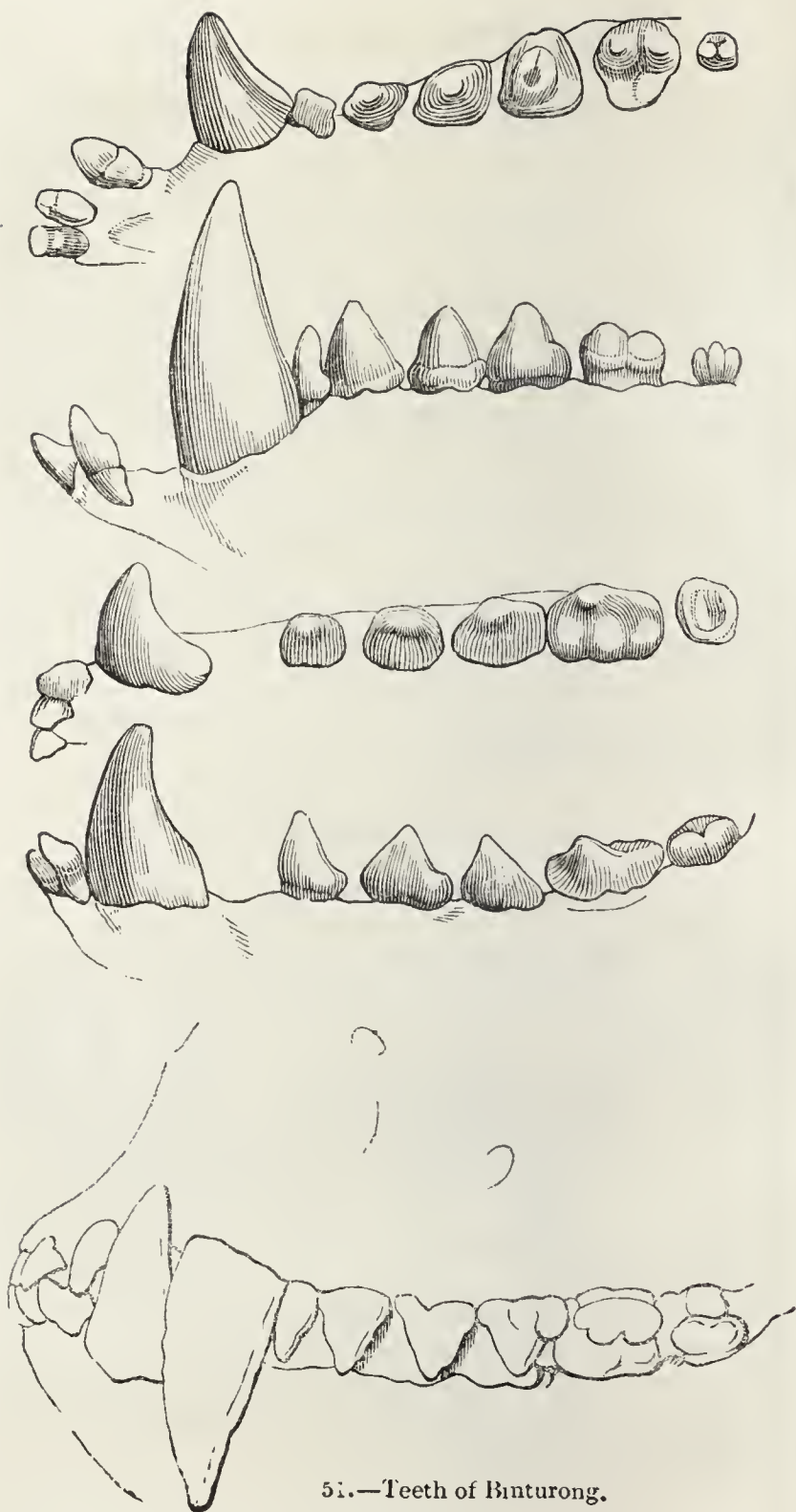
50.—The Paradoxure.

diet. It prefers, however, the delicate and pulpy fruits, but when pressed by hunger attacks fowls and birds. It is most abundant near the villages situated at the confines of large forests, and constructs a simple nest in the manner of squirrels, of dry leaves, grass, or small twigs, in the forks of larger branches or in the hollow of trees. From these it sallies forth at night to visit the sheds and hen-roosts of the natives, in search of eggs, chickens, &c. Its rambles are also particularly directed to gardens and plantations, where fruits of every description within its reach, and particularly pine-apples, suffer extensively from its depredations." The coffee-plantations in some parts of the island are greatly infested by it, and on this account it has obtained the name of coffee-rat. It selects the most ripe and perfect berries, and as the seeds pass uninjured through the alimentary viscera, it spreads that plant extensively, and gives origin to splendid groves in various parts of the forests, but particularly on the declivities of hills, thus counterbalancing the injuries it commits. Its native name is Leewak.

THE BINTURONG.



Fig. 51 represents the dentition of the Binturong (*Artitis Binturong*, Tem.; *Ictides ater*, Cuv.). This animal, a native of Java and Sumatra, represents in its own country the kinkajou of the forests of South America. It is a slow, heavy, plantigrade animal, with short limbs, and a long, powerful, prehensile tail, very thick and muscular at the base, and with which it assists itself in climbing, being arboreal in its habits. One that was kept alive many years by Major Farquhar partook both of animal and vegetable food. It is timid and nocturnal, sleeping during the day, and wandering about at night in quest of food. In size it exceeds a domestic cat, measuring two feet five inches in the length of the head and body, the tail being upwards of two feet. Its fur is long and coarse; general colour black; pupils of the eyes linear. Cuvier notices the approximation of these animals to the racoons.



51.—Teeth of Binturong.

FAMILY—MUSTELIDÆ, or the WEASELS, &c.

Smaller, for the most part, than the animals of the cat tribe (Felidæ), and consequently less formidable as far as man is concerned, but equally carnivorous and sanguinary, the Mustelidæ (we speak of the typical species) are appointed to prey on the multitudinous races of the weak and the timid—such as birds, rabbits, hares, and even fish and reptiles: of slender elongated figure, and with short legs, they appear to glide along, and indeed, from the extreme flexibility and the cylindrical form of their bodies, which enable them to force their way through the smallest openings, they have been termed Vermiform Feræ. They are silent, cautious, and creeping, and attack their prey with unflinching resolution. Having seized their victim, they never let go their hold. They generally aim at the neck below the ear, where they pierce the large blood-vessels with their teeth, or they fix upon the back of the head and drive their teeth through the skull. Few quadrupeds exceed them in agility and address; they bound and spring with vigour, and climb trees with astonishing dexterity, traversing the branches with a rapid gliding motion. Of nocturnal habits, they pass the greatest part of the day in their retreats, which are in the hollows of decayed trees, in burrows, holes in walls, and similar places. With the approach of night they rouse from their slumbers, and, greedy for blood, begin their prowl. A polecat in the neighbourhood of a farmyard is a direful pest, and in one night will destroy a whole brood of poultry, for the sake of the blood and brains.

The shortness of the muzzle, the characters of the teeth, and the solidity of the skull, form a good index of the disposition of these animals. In the genus *Putorius* (*Mustela*), of which the polecat is an example, the dentition is as follows:—Incisors, $\frac{6}{6}$; canines, $\frac{1-1}{1-1}$; false molars, $\frac{2-2}{3-3}$; carnassière, $\frac{1-1}{1-1}$; small tubercular molar, $\frac{1-1}{1-1}$. In the genus *Martes*, Ray (*Mustela*,

Cuvier), of which the Marten is an example, the false molars are $\frac{3-3}{4-4}$. In the genus *Gulo* the dentition (as seen in Fig. 52) is as in the genus *Martes*.

In a commercial point of view the present family is by no means unimportant. From several species the most costly furs are procured, pre-eminent for beauty; we need only mention the sable (*Martes Zibellina*), and the ermine (*Mustela erminea*). The true sable is a native of the dreary regions of Siberia, where it haunts the gloomy pine-forests which stretch over immense tracts of country remote from human abodes. It is into the midst of these wilds that the sable-hunter has to penetrate in the pursuit of his game, and the chase is carried on in the winter, for it is then that the fur is the finest. Great are the hunter's perils and privations. He has to traverse plains and mountains covered with snow, and swept by the keen tempests of an arctic winter—to spend days and nights in patient watching, and in the solitudes of the dismal forest;—he is exposed to overwhelming snow-storms, of which, in our climate, we can form but an imperfect idea. He often loses his way; his provisions fail, and he finds himself exposed to all the horrors of cold and famine. Who has not heard of the hardships of the hunter of sables in the deserts of Siberia?

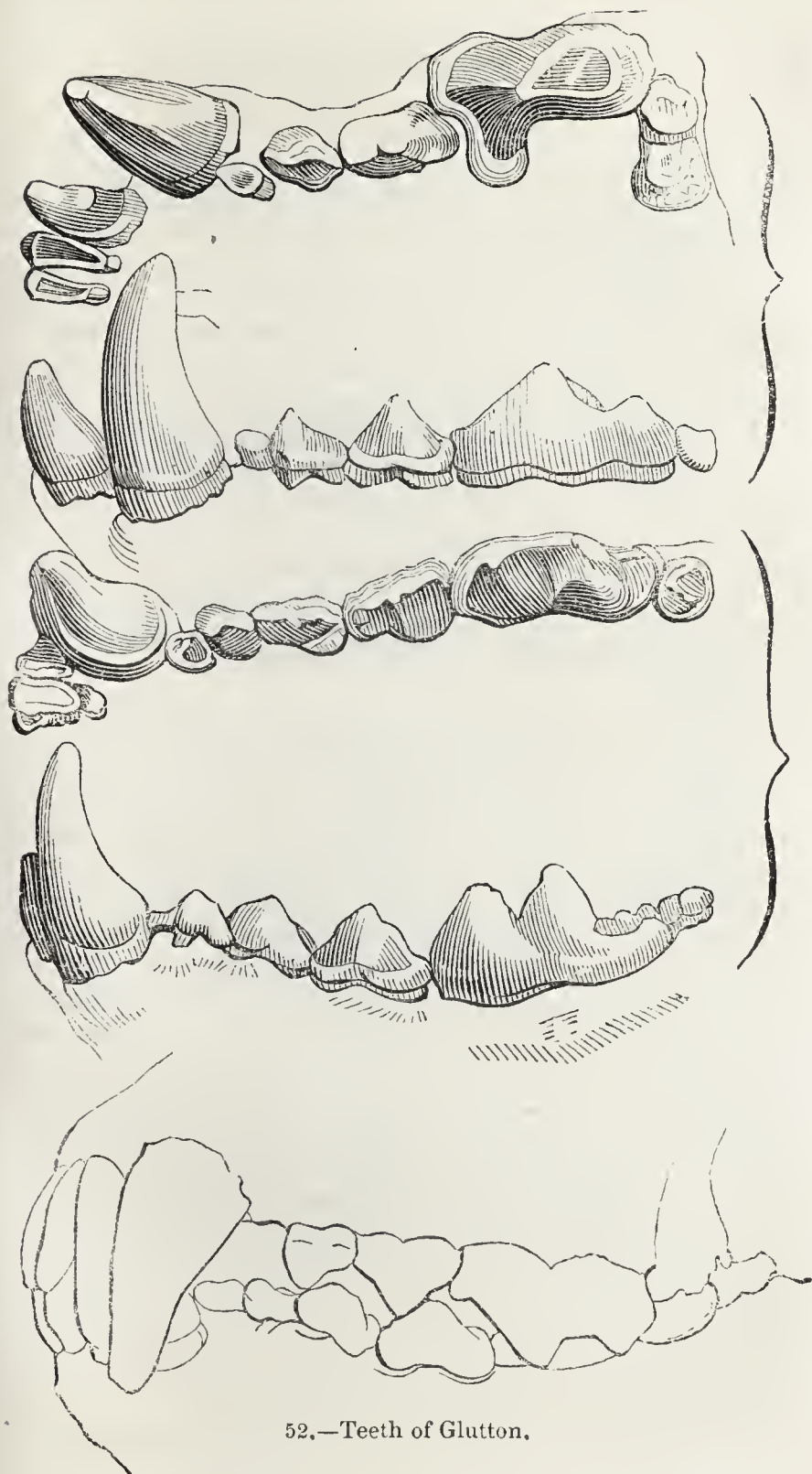
BRITISH MUSTELIDÆ.

We now come to a most interesting group of British *Mustelidæ*, typical of the family. The Polecat (*Mustela Putorius*); the Stoat (*Mustela erminea*); the Beech-Marten (*Martes fagorum*); the Ferret (*Mustela furo*); the Weasel (*Mustela vulgaris*); the Pine-Marten (*Mustela abietum*); and the Beech-Marten (*Mustela fagorum*).

THE POLECAT

(*Mustela Putorius. Putorius communis*, Cuv.).

This species forms the type of Cuvier's genus *Putorius*, which he has, we think without sufficient reason, ex-



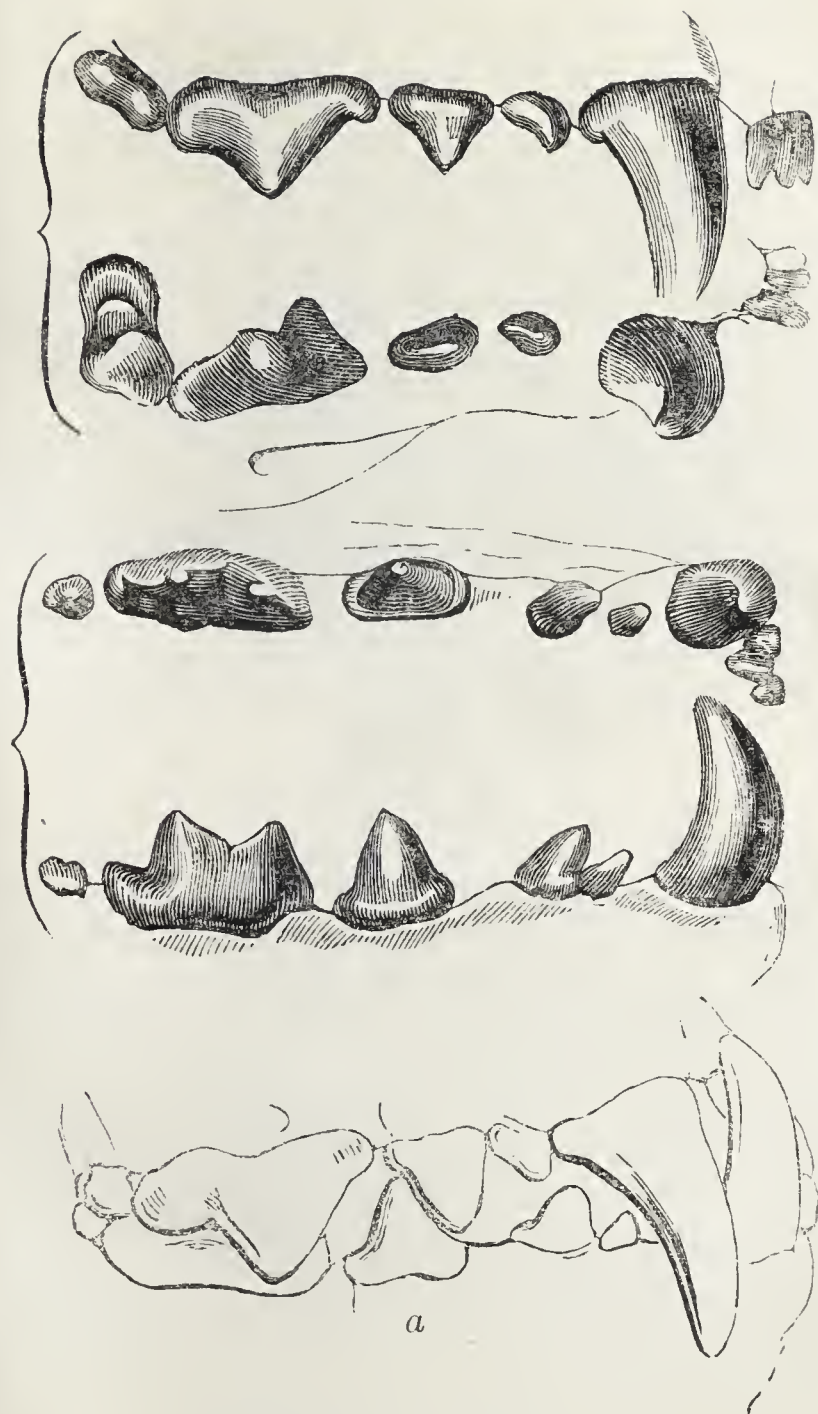
52.—Teeth of Glutton.

changed for that of *Mustela*; while on the contrary he has assigned the term *Mustela* as the subgeneric name of the Martens, to which Ray had long since given the more appropriate name of Martes. The latter name is adopted by Mr. Bell in his 'British Quadrupeds,' who takes no notice of *Putorius* as applied to the polecats and weasels by Cuvier. A needless alteration of names is ever to be avoided by the naturalist, as tending not to simplicity and knowledge, but confusion and doubt.

Fig. 53 represents the dentition of the *Mustela* (*Putorius*, Cuvier), which is as follows:—Incisors, $\frac{6}{6}$; canines, $\frac{1-1}{1-1}$; false molars, $\frac{2-2}{3-3}$; carnassière, $\frac{1-1}{1-1}$; tubercular molar, $\frac{1-1 \text{ trilobed}}{1-1 \text{ minute}}$: *a* represents the teeth of both jaws together.

The Polecat, Fitchet, or Foumart is very common in some parts of our island, where the farmer and the sportsman make common cause against it. Poultry, young and old, ducks, geese, and turkeys fall a prey to its sanguinary disposition; it destroys all within its reach. Mr. Bell instances one case in which sixteen large turkeys were killed by a polecat during the course of one night, and another in which ten ducks were similarly destroyed, and the perpetrator of the outrage, when in the morning the door of the outhouse in which they were shut was opened, marched out, licking his bloody jaws, without the slightest alarm. Many similar instances have come under our own personal knowledge. The predilection of the polecat for the brains and the blood of poultry is well known; it seldom touches the rest of the carcass; and we may here observe that rats display the same taste for the brains of birds. We could adduce many instances, within our own knowledge, in which birds kept in aviaries have been destroyed by rats, the brain of the victims being in every case eaten out of the skull. (Fig. 54.)

It is generally in winter that the polecat haunts the



53.—Teeth of Polecat.



54.—Polecat.

farm-yard. In summer it resorts to plantations, woods, and preserves of game, where it makes havoc among leverets, young partridges, and pheasants; nor are the nests of birds safe from its attacks, the eggs or callow brood being equally acceptable. No animal is more pernicious in the rabbit-warren. It can follow its prey through their subterranean galleries, which the fox cannot do; besides which, its love of slaughter seems insatiable. It would appear that even the tenants of the water are not safe from its attacks. Mr. Bewick, on his own testimony, affirms that in one instance eleven fine eels were discovered in the retreat of a polecat near a rivulet, to which its nocturnal visits were rendered apparent by tracks in the snow, both of its feet and of the writhing eels. In Loudon's 'Magazine' (vol. vi. p. 206) an instance is related in which the nest of a female

polecat was opened containing five young ones, while in a side hole were packed forty large frogs and two toads, barely alive, each having been paralyzed by a bite through the brain. When attacked by dog or man, the polecat makes a vigorous resistance, and will defend itself to the last. The female breeds in the spring, making a nest of dry grass in her burrow. The young are from three to five in number. The adult polecat measures about one foot four or five inches in length, exclusive of the tail, which measures nearly six inches. The body is covered with a woolly undercoat, and this, with the base of the long hairs, which form an outer garment, is of a pale yellow ; the extremities of the long hairs are of a deep glossy blackish-brown ; the margins of the ears and part of the lips are white.

Though by no means so valuable as that of the sable or marten, the fur of this animal (known generally by the name of Fitch) is imported very extensively from the north of Europe, and is abundant in the furriers' shops of our metropolis.

THE FERRET

Is closely allied to the polecat ; so closely, indeed, that many naturalists regard them as the same species, the more especially as a mixed breed between them may be procured. We do not, however, consider this opinion to be correct. The polecat is a native of temperate and northern Europe ; the ferret of Africa, whence, as we are told by Strabo, it was imported into Spain for the purpose of destroying rabbits, with which, at one period, that country was injuriously overrun. From Spain it has spread through the rest of Europe, not as a wild, but as a domesticated animal.

From the earliest times it was used in the capture of rabbits by being turned, muzzled, into their burrows. Pliny alludes to this practice in his eighth book. The ordinary colour of the ferret is yellowish-white ; but we have frequently seen specimens of a brown colour ; these, indeed, were said to be of the mixed breed between the



55.—Ferret.

polecat and the ferret, and probably were so, as they were always larger and stouter than the white. (Fig. 55.) One of the brown kind, in the possession of a relative of the writer's, was so tame as to be allowed the liberty of the house, and it slept in his chamber—a dangerous experiment, as instances have been known of their attacking persons and wounding them severely. An instance in which an infant nearly fell a sacrifice to a ferret is related by Mr. Jesse, in his 'Gleanings,' and quoted by Mr. Bell. The child had the jugular vein and the temporal artery opened; the face, neck, and arms lacerated; and the sight of one eye destroyed. The ferret is not only employed by the warrener, but also by the rat-catcher, who prefers the mixed breed.

The ferret is very sensitive of cold, and requires to be kept snug and warm, especially during winter, as it perishes if exposed to the severity of the season.

THE WEASEL (*Mustela vulgaris*)

Is so well known, that any description of its form and colour is useless. Small as this animal is, it has all the courage and ferocity of its race, and will prey upon leverets, chickens, young pigeons, and ducklings; its favourite food, however, are mice, rats, water-rats, and even moles. In the farmer's stack-yard and granary it is of the greatest utility, and well repays by valuable services the occasional abstraction of a chicken, a pigeon, or a few eggs. Of this, indeed, many farmers are well aware, and encourage it for the sake of the incessant warfare it keeps up against mice and rats, which, from their excessive numbers, often occasion a serious loss in grain, besides undermining the barns and outhouses.

The weasel climbs trees and runs up the side of a wall with facility, its movements being singularly graceful.



(Fig. 56.) When it attacks its prey, it fixes its teeth on the back of the head, and pierces the brain, which it then devours. It is said to prefer putrid flesh to that just killed, but this is very doubtful, and has arisen most probably from the circumstance of dead birds in a putrid state having been found in its hole or near its retreat, left by their destroyer. The weasel hunts by the scent, like a dog; and follows mice and moles with the utmost perseverance, tracking them through all their runs or winding galleries. It will even cross the water in the pursuit, if its prey be in sight, nor does swiftness avail, for onwards will the weasel travel, till its victim fails from exhaustion. The wolverene of North America (*Gulo arcticus*) pursues the beaver and other prey in a similar manner.

Instances are on record in which several weasels have united in attacking men, who with difficulty have prevented the fierce little animals from lacerating their throats, and certainly twelve or fifteen weasels would prove no mean adversaries.

The weasel often falls a prey to hawks, owls, and kites; but sometimes succeeds in coming off victorious. Many anecdotes are on record of weasels and stoats bringing eagles or large hawks to the ground—and Mr. Bell gives an instance, assuring us of its truth, in which a kite that had seized a weasel and mounted into the air, was observed to wheel irregularly, and at length to fall to the ground dead; the determined little animal having torn open the skin and large blood-vessels under its wing.

The weasel breeds two or three times in a year, having a litter of five at each birth. She makes her nest of dry herbage; a hole in the bank-side, among brambles, or in an aged tree, is the usual place of her retreat; and when molested, she defends herself and her progeny with indomitable courage.

THE STOAT (*Mustela erminea*)

Is allied very closely to the weasel, but is considerably larger, being upwards of nine inches long, excluding the tail. Its habits are precisely those of the weasel, but it



57.—Ermine : Summer dress.



58.—Ermine : Winter dress.

preys habitually on larger game, as hares, leverets, &c., not excluding the rat and water-rat. Of the latter, indeed, it destroys great numbers, following them into their burrows. It hunts its prey by the scent. Some idea of the extent of the depredations of this animal may be conceived from the circumstance of two leverets, two leverets' heads, two young partridges, and a pheasant's egg, having been found in the retreat of one. In our climate the stoat becomes partially white during the winter, but in more northern regions this change is complete. Large importations of ermine-fur are made from Russia, Norway, and Siberia to our country. In 1833 the importation amounted to 105,139 skins. Fig. 57 represents this animal in its summer dress; Fig. 58 exhibits, in its winter livery of snowy white, the tip of the tail remaining black, a beautiful contrast. In this stage it is the ermine of the furriers.

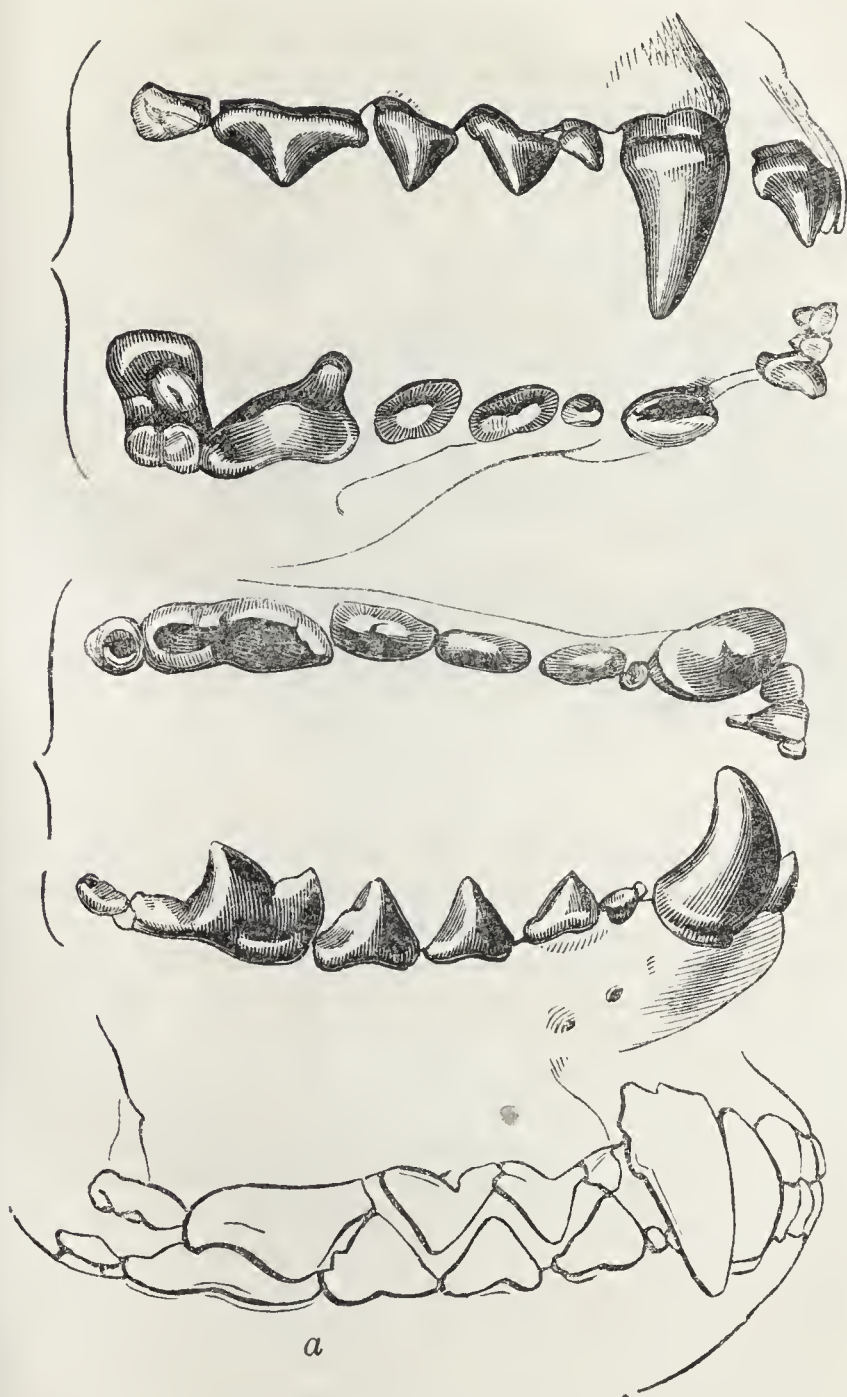
THE BEECH-MARTEN AND THE PINE-MARTEN.

The Beech-Marten (*Martes fagorum*) and the Pine-Marten (*Martes abietum*) are both natives of our island.

Fig. 59 represents the dentition of the genus *Martes*, which chiefly differs in the false molars, which stand $\frac{3-3}{4-4}$; *a* shows the teeth of both jaws together.

The principal differences between the Pine-Marten and the Beech-Marten consist, according to Mr. Bell, "in the greater length of the legs, and the smaller head of the Pine-Marten; its fur, too, is more abundant, of a finer and softer texture, and of a richer colour; and is consequently more highly valued, though it is not nearly equal to that of the sable." The Beech-Marten is the most common of the two species in our country, excepting in certain districts. We are not quite sure that they are not mere varieties of each other.

It must be confessed, however, that the specific distinction between these two animals is by no means very apparent, nor indeed is it admitted by many. We have many times seen the yellow-breasted or pine-marten in



59.—Teeth of Marten.



60.—The Pine-Marten.

the fir-woods which clothe the sides of some of the hills in Derbyshire, and especially near Buxton. It prefers wild and unfrequented places, deep wooded glens, and the depths of forests; and is common throughout northern Europe. The beech-marten also frequents woods, but not so exclusively as the former, and often lurks about farm-houses and destroys poultry. Both are destructive to game. They take up their retreats in hollow trees or holes in rocks, and the female makes a nest of leaves and moss for her brood. The agility and gracefulness of these animals are remarkable; they climb trees with the ease of the squirrel, and traverse their branches or leap from bough to bough with admirable address and celerity. Their fur, especially that of the pine-marten, is full, deep and soft, and of a beautiful brown, and not far inferior to that of their immediate ally the sable. The marten exceeds the polecat in size, and the tail is long and bushy.



61.—Pine-Marten.

The ears are large and open, and the eyes bright and lively. In general instincts they agree with the other *Mustelæ*. (Figs. 60, 61, 62, and 63.)

Distinct from both of these we regard the American pine-marten, characterized by a shorter tail and fuller fur. Its skins are annually imported into England from North America, where it is abundant in the high latitudes. Dr. Richardson observes, that in America "particular races of martens, distinguished by the fineness and dark colour of their fur, appear to inhabit certain rocky districts. The rocky, mountainous, but wooded region of the Nipogon, on the north side of Lake Superior, has been long noted for its black and valuable martens' skins." The animal is usually taken in traps baited with the head of a bird. It is very bold, and when attacked shows its teeth, hisses like a

eat, and bites with great severity. "Upwards of one hundred thousand skins have been collected annually in the fur countries." Another and larger species, the Pekan, or Fisher (*Martes Canadensis*), is common in the northern parts of America, ranging from Pennsylvania to the Great Slave Lake, and from shore to shore across the country. Its fur is less valuable than that of the former. It gives preference to damp spots and humid forests bordering water.



62.—Beech-Marten.

THE GLUTTON (*Gulo arcticus*, Desm.).

Pallas and Gmelin referred the Glutton to the genus *Ursus*; it belongs, however, to the present family: see its dentition (Fig. 52). Linnæus rightly regarded it as



63.—Beech-Marten.

a *Mustela*.* In their general port and figure the gluttons are intermediate between the polecats and the badgers. They have no decided scent-pouch, but a glandular fold of the skin.

Two varieties, perhaps species, of Glutton are known : one, a native of the high northern latitudes of the Old World ; the other, of the cold regions of America. The Old World species (*Gulo arcticus*), the Rossomak of the Russians, is of a deep chestnut passing into black on the limbs, with a brown disc on the back. The American animal (*Gulo luscus*, Sabine), termed Wolverene, Carcajou, and Quick-hatch, is paler. The glutton is nocturnal in its habits ; the limbs are strong and short ; the feet subplantigrade, with five toes, armed with sharp claws ; the head broad, ending in a narrow muzzle ; the ears are short and rounded ; the tail moderate. (Fig. 64.)

* ‘Syst. Nat,’ 12th edit. He retains, however, the term *Ursus* for the Wolverene, naming it *Ursus luscus*.

As we are inclined to regard the Old World and American gluttons as mere varieties, we shall not disjoin their history. The first writer who has described this animal is Olaus Magnus. "Among all animals," he says, "which are regarded as insatiably voracious, the glutton in the northern parts of Sweden has received an express appellation, being called, in the language of the country, Jerff; and in German, Vielfrass. In the Slavonian language its name is Rossomaka, in allusion to its voracity; in Latin, however, it is only known by the fictitious name of Gulo, from its habits of gorging (*gulo à gulositate appellatur*)."—Ol. Mag., 'Hist. de Gent. Septent.'

The glutton is indeed a voracious animal, but by no means formidable to man or the larger beasts, though, in



64.—Glutton.

proportion to its size, its strength is very great. Slow in its movements, it makes up by perseverance and industry for this defect, and at a steady pace pursues its prey for miles, hunts out weak or dying animals, and destroys hares, marmots, and birds, which it seizes unawares.

Buffon, relying on the authority of Olaus Magnus, Isbrandt, and others, has contributed to render current the statement (which many later naturalists have deemed not incredible) that the glutton has recourse to the most subtle artifice in order to surprise its victims, and that it lurks in the branches of trees until the reindeer approaches to browse beneath, when it throws itself upon the unsuspecting animal with unerring rapidity, fixes its strong claws in the skin, and proceeds to tear the neck and throat, till the wretched victim falls exhausted and dies, when the victor devours his prey at leisure. Gmelin, in his account of his journey through Siberia, after quoting the statement of Isbrandt, adds, "This address of the glutton managing to seize animals by surprise is confirmed by all hunters." "Although it feeds on all animals, living or dead, it prefers the reindeer. It lies in wait for large animals as a robber on the highway, and it also surprises them as they lie asleep." To the circumstance of the glutton fixing on the reindeer, and also the elk, Desmarest expressly alludes, evidently relying on the narratives of the earlier writers. On the contrary, Dr. Richardson, in his able history of the American glutton, or wolverene, affirms that no such artifice is resorted to by that variety, and he appears altogether to disbelieve the account. No doubt the details have been exaggerated, still we are not altogether to throw aside the assurances of old travellers of credit; indeed we think it very probable that the glutton may steal upon the reindeer asleep, or attack enfeebled or dying deer, or young fawns, and fixing on the great blood-vessels of the throat (as the weasel does when attacking the hare), thus destroy its victims. Gmelin, Dr. Richardson, and Mr. Graham agree in the fact that the glutton is extremely annoying to the fur-hunters,

visiting their traps and devouring the animals taken in them. In Siberia, it rifles the traps of the sable and corsac fox; and, as Mr. Graham observes, in northern America it will follow "the marten-hunter's path round a line of traps extending 40, 50, or 60 miles, and render the whole unserviceable merely to come at the baits, which are generally the head of a partridge on a bit of dried venison. They are not fond of the martens themselves, but never fail of tearing them in pieces or of burying them in the snow by the side of the path at a considerable distance from the trap. Drifts of snow often conceal the repositories thus made, in which case they furnish a regale to the hungry fox, whose sagacious nostril guides him unerringly to the spot. Two or three foxes are often seen following the wolverene for this purpose." During the summer the beaver is the common prey of this animal.

The glutton is nocturnal, cunning, and determined; it fights very resolutely, and is more than a match for a single dog, its strength being very great. Its fur is in much request, especially that of the Siberian animal, which is dark and beautifully glossy. The length of the glutton, exclusive of the tail, is about two feet six inches; that of the tail, including the long full fur, ten inches. The female breeds once a-year, the cubs being from two to four in number. Their fur is soft, downy, and of a pale yellowish white.

THE GRISON

(*Galictis vittata*, Bell; *Gulo vittatus*, Desmarest; *Viverra vittata*, Linn.; *Petit Furet*, D'Azara; *Grisonia vittata*, Gray; *Lutra vittata*, Trail; *Ursus Braziliensis*, Thunberg; *Fouine de la Guyane*, Buff. 'Suppl. III.').

The grison is a native of the intertropical provinces of America, Guiana, Paraguay, and Brazil. It is remarkable for its sanguinary and fierce disposition, and the disgusting odour of the secretion of its scent-glands. A specimen was living some time since in the Menagerie of the Zoological Society, and its death afforded us an opportunity of investigating its internal anatomy.



65.—Grison.

(‘Zoological Proceedings,’ 1833, p. 140.) In its figure the grison is very elongated, the head is flat, and the muzzle somewhat acute; the general colour is grizzled black; the top of the head and neck gray, with a white semilunar-shaped band across the forehead, extending to the shoulders. Length of body one foot six inches; of tail six inches and a half. (Fig. 65.) A second and larger species has been characterised by Mr. Bell, under the name of *Galictis Allamandi*. Linnæus applied the name of *Mustela barbata* to a large musteline animal inhabiting the woods on Brazil and Paraguay, which Azara denominated the *Grand Furet*, and Pennant the Guiana Weasel. By Desmarest it is referred to the genus *Gulo*,

and is termed *Gulo Barbulus*. This animal is the 'Taira (or *Galera* of Brown). Two specimens from Trinidad, differing from each other in colouring, are preserved in the Museum of the Zoological Society. (See 'Proceeds. Zool. Soc.,' 1831, p. 74.) To the musteline group belong the Zorilles of Africa: most writers seem to consider the Zorille as constituting a single species (*Zorilla Capensis*). We are however of opinion that the Cape species is different from that which we have seen repeatedly from the northern coast of Africa. The Senegal zorille has not come under our notice, but it is stated to differ from the Cape animal. The zorille is less than the polecat, and, like that animal, is fierce and exceedingly active. It dwells in burrows, which it digs in the ground, concealing itself during the day. The colour of the back is an irregular mixture of black and white, in broken or indefinite lines. The head, sides, and under-surface are black, with the exception of a white oval spot on the forehead, and a white mark over each eye. To this genus is apparently referable a species from Madagascar, *Mustela striata*, Geoff.; *Putorius striatus*, Cuv.; *Galictis striata* of Isidore, Geoffroy.

THE SKUNK (*Mephitis Americana*).

Several species of these animals, called Mouffettes, Mephitic Weasels, Bêtes puantes, Enfants du Diable, &c., are natives of America. The genus is intermediate between that of the polecats and the badgers.

These animals are notorious for the intolerable odour of the secretion of their glandular pouches, which neither man nor dog can endure. The head is small, the snout pointed, the body robust and covered with long coarse hair, the tail rather long and very bushy. The general colour of the upper surface is white, interrupted by a stripe, more or less broad, of black along the spine; the limbs and under surface are black. (Fig. 66.) According to Kalm, the skunk of North America "brings forth its young in the hollows of trees and in burrows; it is not confined to the ground, but climbs trees; it is an



66.—Skunk.

enemy to birds; it destroys their eggs and also devours their young; and when it can enter the poultry-roost it makes great destruction. When it is chased either by men or dogs it runs as far as it can or climbs a tree; but when it finds itself hard pressed, it ejects its fluid against its pursuers: the odour of this is so strong as to suffocate; if a drop of this pestilential secretion falls in the eyes, it is at the risk of losing sight; and when it falls on the clothes, it communicates an odour so powerful, that it is very difficult to get rid of it; most dogs fear to attack it, and flee when touched by a drop." Mr. Graham confirms this account, and says that he knew several Indians



67.—Teeth of Skunk.



who had lost their eyesight in consequence of inflammation produced by this fluid having been thrown into them by the animal, which has the power of ejecting it to the distance of upwards of four feet. The odour produces nausea, a sense of suffocation, and not unfrequently fainting. Audubon, in his 'Ornithological Biography' (p. 310), gives, under the name of "Polecat," an amusing narrative, proving how long wearing-apparel tainted with the odorous secretion preserves, spite of every attempt to remove it, the overpowering effluvium. With all this, however, the skunk is often taken young and tamed, when the animal seldom gives out its pestilential secretion; its flesh, moreover, is very frequently eaten



69.—Head of Skunk.

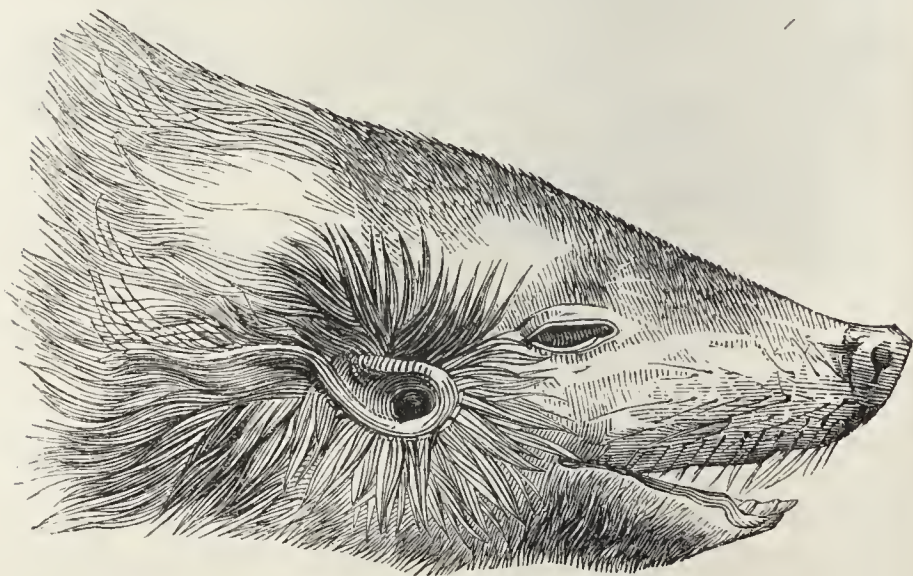
and is said to be well flavoured. It appears that when the natives kill a skunk, they remove the whole of the glandular sacs, in order that no unpleasant smell or flavour may be communicated to the flesh. In the northern latitudes the skunk passes its winter in a hole, seldom stirring abroad, and then only for a short distance. It

preys on young hares, rats, and mice, and has been observed to feed much on frogs. The skunk is about eighteen inches in length, exclusive of the tail, which is nearly as long as the body. Fig. 67 represents the dentition of the genus *Mephitis*; Fig. 68, the incisors and canines. Fig. 69 represents the head of another species of the present genus (*Mephitis dimidiata*). Besides the common skunk (*Mephitis Americana*) four distinct species are in the Museum of the Zoological Society. From the genus *Mephitis* we pass by an easy transition to that group of the Mustelidæ which includes the Ratel, the *Mydaus* or Teledu, and the Badgers.

THE TELEDU (*Mydaus meliceps*, F. Cuv.).

In Java and Sumatra the Teledu holds the place of the skunks in America, and may be regarded as representing them; it agrees with them in dentition and general habits, and the secretion of a fluid insupportably disgusting.

The teledu is considerably less than a badger in size;



70.—Head of Teledu.

the ears are close and scarcely apparent (see the Head of the Teledu, Fig. 70); the head is conical, and the snout gristly at the tip and almost destitute of hair. The feet are remarkably strong, the toes, five in number, being united as far as the last joint, and armed with enormous claws, especially those of the fore-feet. The hair of the body is coarse, and rises to a peak on the occiput, that covering the neck being directed forwards. The general colour is deep brown; a white stripe, beginning broad on the top of the head and back of the neck, runs along the spine, and includes the short tuft-



71.—Teledu.

like tail. (Fig. 71.) The teledu is slow in its motions, and lives in burrows which it excavates in the earth. Notwithstanding its offensive odour, it is eagerly sought for by the natives, who prize its flesh as food, which, if the animal be surprised and suddenly despatched, is almost entirely free from any offensive taint. The following in-

teresting account of this animal is from the pen of Dr. Horsfield, who investigated its native regions. "The *mydaus meliceps* presents a singular fact in its geographical distribution. It is confined exclusively to those mountains which have an elevation of more than 7000 feet above the level of the ocean ; on these it occurs with the same regularity as many plants. The long extended surface of Java, abounding with conical points which exceed this elevation, affords many places favourable for its resort. On ascending these mountains, the traveller scarcely fails to meet with our animal, which, from its peculiarities, is universally known to the inhabitants of these elevated tracts, while to those of the plains it is as strange as an animal from a foreign country. A traveller would inquire in vain for the teledu at Batavia, Samarang, or Surabaya. In my visits to the mountain districts I have uniformly met with it, and, as far as the information of the natives can be relied on, it is found on all the mountains. It is, however, more abundant on those which, after reaching a certain elevation, consist of numerous connected horizontal ridges, than on those which terminate in a defined conical peak. Of the former description are the mountain Prahu, and the Tengger Hills, which are both distinctly indicated in Sir Stamford Raffles's map of Java. It was less common on the mountain Gede, south of Batavia ; on the mountain Ungarang, south of Samarang ; and on the mountain Tjen, at the farthest extremity ; but I traced its range through the whole island.

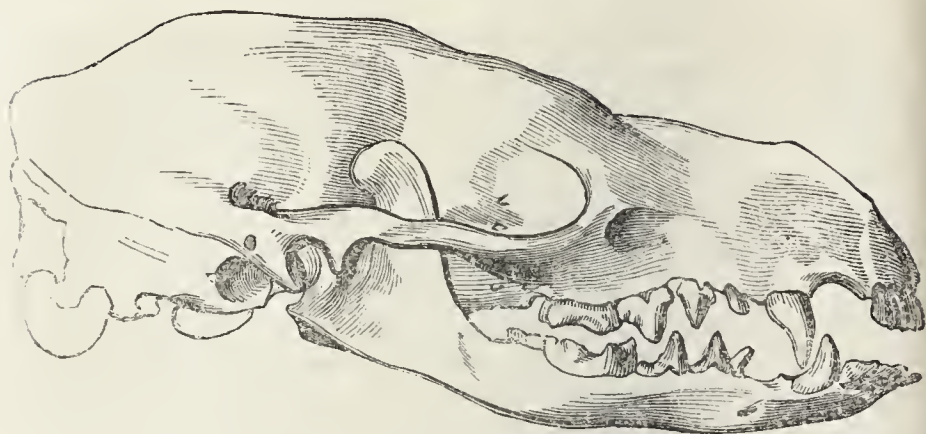
"Most of these mountain-ridges furnish tracts of considerable extent, fitted for the cultivation of wheat and other European grains. Certain extra-tropical fruits are likewise raised with success ; peaches and strawberries grow in considerable abundance, and the common culinary vegetables of Europe are cultivated to a great extent. To most Europeans and Chinese a residence in these elevated regions is extremely desirable ; and even the natives, who in general dislike its cold atmosphere, are attracted by the fertility of the soil, and find it an advantage to establish villages and clear the grounds for culture.

“Potatoes, cabbages, and many other culinary vegetables are extensively raised, as the entire supply of the plains on these articles depends on these elevated districts. Extensive plantations of wheat and other European grains, as well as of tobacco, are here found, where rice, the universal product of the plains, refuses to grow. These grounds and plantations are laid out in the deep vegetable mould, where the teledu holds its range as the most ancient inhabitants of the soil. In its rambles in search of food this animal frequently enters the plantations, and destroys the roots of young plants; in this manner it causes extensive injury; and on the Tenger Hills particularly, where these plantations are more extensive than in other cultivated tracts, its visits are much dreaded by the inhabitants. It burrows in the earth with its nose, in the same manner as hogs, and in traversing the hills its nocturnal toils are observed in the morning in small ridges of mould recently turned up.

“The *mydaus* forms its dwelling at a slight depth beneath the surface, in the black mould, with considerable ingenuity. Having selected a spot defended above by the roots of a large tree, it constructs a cell or chamber of a globular form, having a diameter of several feet, the sides of which it makes perfectly smooth and regular; this it provides with a subterranean conduit or avenue, about six feet in length, the external entrance to which it conceals with twigs and dry leaves. During the day it remains concealed like a badger in its hole; at night it proceeds in search of its food, which consists of insects and their larvæ, and worms of every kind. It is particularly fond of the common lumbrici, or earth-worms, which abound in the fertile mould. The teledu, agreeably to the information of the natives, lives in pairs, and the female produces two or three young at a birth.”

When taken young, the teledu is easily tamed, and perfectly inoffensive.

Fig. 72 represents the Skull of the Teledu; Fig. 73, the teeth of the upper jaw; Fig. 74, the teeth of the lower jaw. The molars, it will be seen, consist, in the upper jaw on each side, of two false—a pointed carnas-



72.—Skull of Teledu.



73.



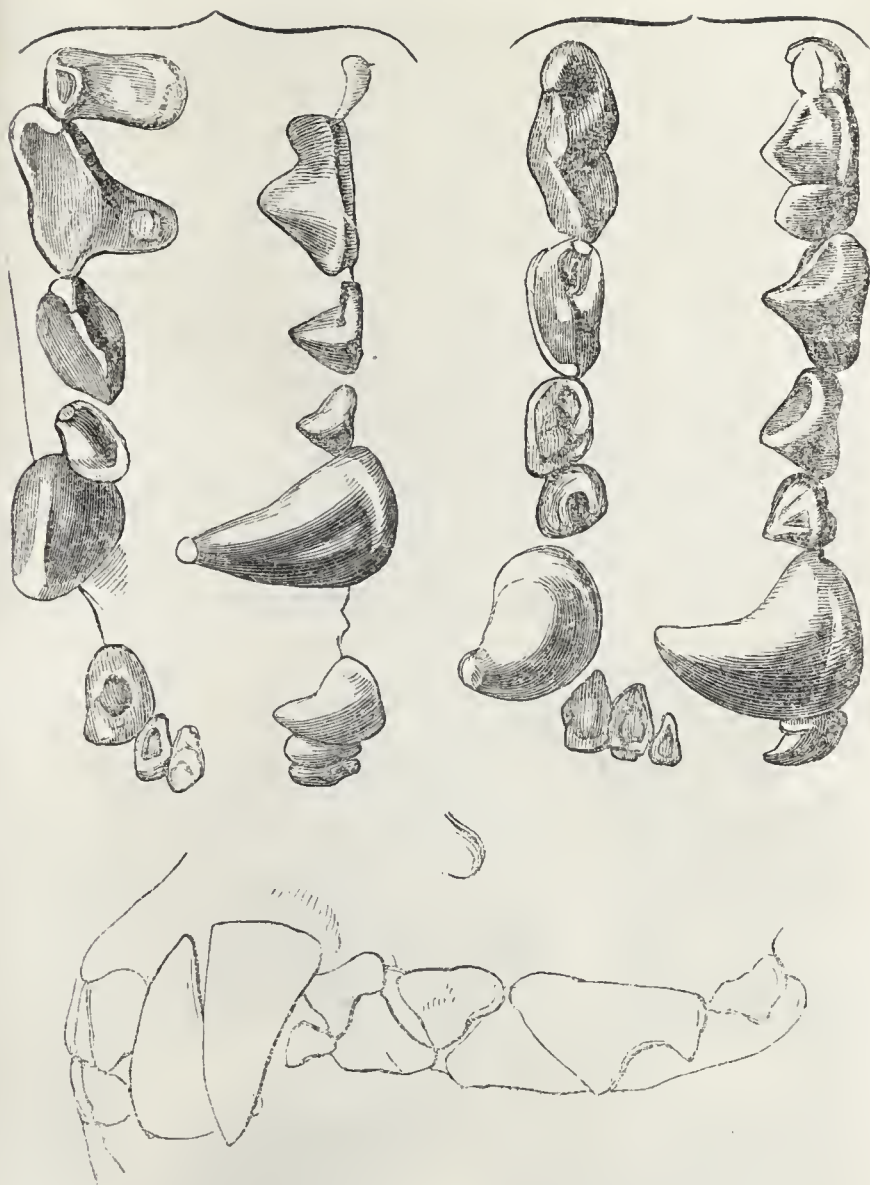
74.

sière, and a large and nearly square tuberculous molar ; in the lower jaw, of three false molars, a large carnas-sière, and a very small tuberculous posterior molar. Incisors and canines as usual.

CAPE RATEL

(*Ratelus Capensis*, F. Cuv.; *Mellivora Capensis*, Storr; *Viverra mellivora*, and *Ursus mellivorus*, Blumenb.; *Taxus mellivorus*, Tiedem.; *Meles mellivora*, Thunberg; *Ratel*, Sparrman; Honey-weasel, Shaw).

In their dentition, the ratels closely approximate to the true badgers (*Meles*), excepting that the last molar



75.—Teeth of Ratel.

is smaller and narrower in proportion from its anterior to its posterior edge. (Fig. 75.)

The Cape ratel is a thickset clumsy animal, with short limbs, and a partially plantigrade walk. The claws are very robust, the muzzle is elongated, the eyes are small

and sunk, and the external ears nearly rudimentary ; the general aspect is badger-like. The Cape ratel is a native of South Africa, and has been celebrated for the destruction it makes among the nests of the wild-bee, to the honey of which it is said to be very partial. Doubtless, however, it avails itself of other food, and probably, like the badger, devours flesh and roots. In the discovery of bees' nests it is said to be directed by the actions and voice of a bird termed the Honey-guide (*Indicator Vaillantii*). These insects, in South Africa, usually build their cells in the deserted excavations of the wild boar or the porcupine, and from these the ratel digs out its plunder. It preys chiefly in the evening, remaining during the greater portion of the day in its burrow. When taken young it is easily domesticated. The hide of the ratel is extremely tough and loose, and, according to Sparrman, if a person catches hold of it by the back



76.—Cape Ratel.

part of the neck, it is able to turn round, as it were, in its skin, and bite the arm that molests it.

The Cape ratel is about two feet six inches long, exclusive of the tail, which is about eight inches. The general colour above is gray, the under parts black, and a white line runs on each side from the ears to the origin of the tail, abruptly dividing these two colours. (Fig. 76.)

THE INDIAN RATEL (*Ratelus Indicus*).

This species, though known to Pennant and Shaw (who termed it *Ursus Indicus*), has only been recently recognised as a distinct species. Lesson was not aware of the difference—nay, neither he nor Desmarest appears to have known of the existence of the Indian ratel; and General Hardwicke, who figured it in the ‘Linn. Trans.,’ vol. xi., makes no allusion to the Cape ratel, apparently overlooking their relationship. Mr. Bennett observes that the only difference he has been able to detect between the Asiatic and African animals consists in the absence of the white line dividing the two colours in the Indian species, and which are not so abrupt. The absence of this line we consider to have been an individual peculiarity. The Indian ratel is a native of various provinces of India, on the high banks of the Ganges and the Jumna, where it rarely comes forth from its burrow by day, but prowls at night about the houses of the natives, enters the cemeteries, and with extraordinary celerity works its way to the bodies recently interred, which it greedily devours. It feeds also upon rats, birds, &c. When taken young, the Indian ratel is easily tamed and becomes playful. It is fond of climbing, but its actions are clumsy, though it securely traverses the larger branches. Its voice is a deep hoarse guttural bark. (See ‘Proceedings of the Zoological Society,’ 1835, p. 113.) (Fig. 77.)

The following description of a specimen from Madras, in the Menagerie of the Zoological Society, is from the pen of Mr. Bennett:—“As far as its manners have yet



77.—Indian Ratel.

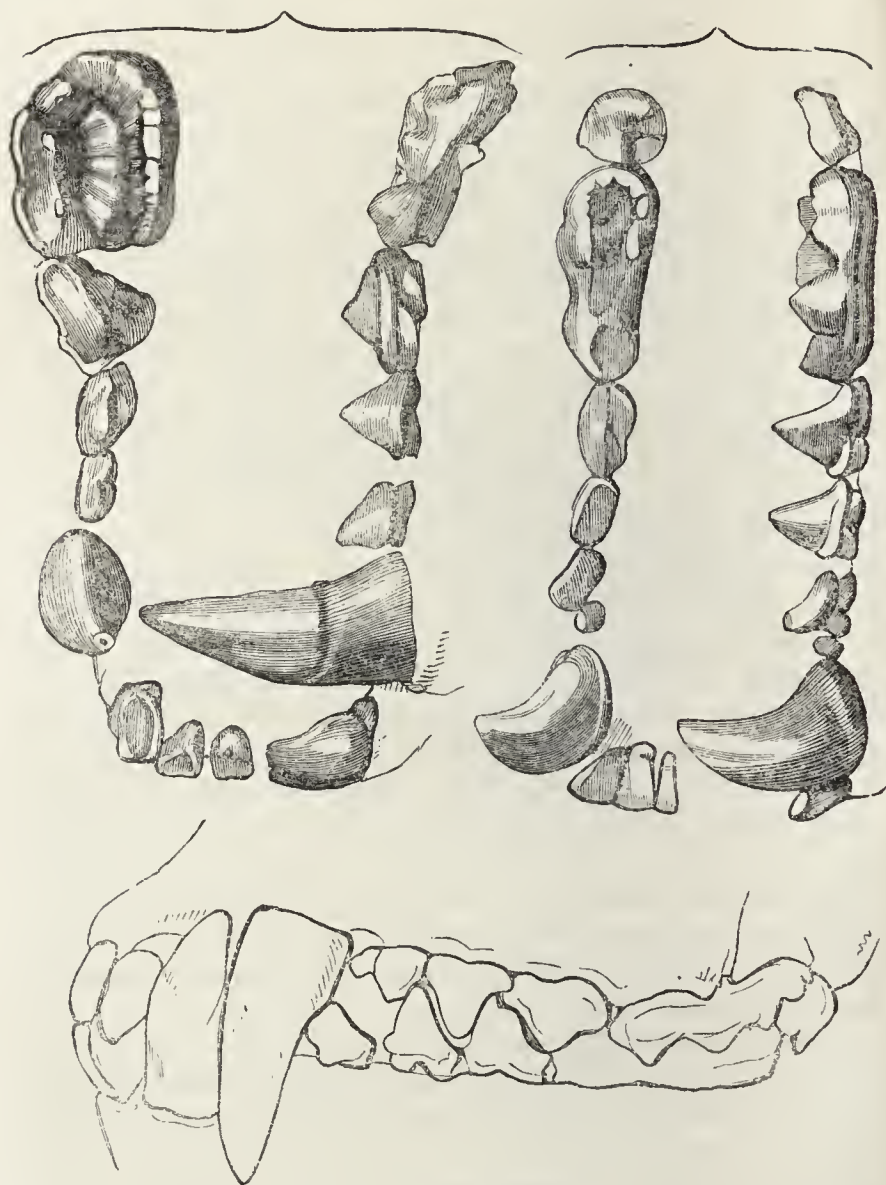
been developed, it appears to be, with regard to man at least, one of the most playful and good-tempered of beasts, soliciting the attention of almost every visitor by throwing its clumsy body into a variety of antic postures, and when noticed, tumbling head over heels with every symptom of delight. But towards animals it exhibits no such mildness of temper; and it is curious to observe the cat-like eagerness with which it watches the motions of any of the smaller among them that happen to pass before its den, and the instinctive dread manifested by the latter on perceiving it. Its food is of a mixed nature, consisting, like that of the bears and other less carnivorous beasts, of bread and milk in the morning, and flesh in the latter part of the day." ('Zoological Gardens.')

THE BADGER (*Meles vulgaris*).

The approximation of this animal to some of the Ursidæ is evident ; yet is there still an important line of demarkation. All the Ursidæ have two true molars ; in the true ursine group the posterior molar is long ; in the aberrant group, including *Ailurus*, *Procyon*, *Nasua*, and *Cercoleptes*, the two molars are nearly equal in size. In the badger, the ratel, &c., as in the polecats, there is but one true molar. That of the upper jaw in the badger is very large (see Fig. 78, the teeth of the badger), and adapted for the mastication of vegetable aliment.

The badger is extensively spread through Europe and Asia ; it is recluse and nocturnal in its habits, frequenting deep woods, where it makes a deep commodious burrow, for the excavation of which its short muscular limbs and powerful claws are well adapted. The burrow has only one entrance, leading into different chambers, and terminating in one of a circular form, which is comfortably lined with grass and hay. Here the animal spends the day in repose, moving out only at night, in search of food. It feeds upon roots, fruits, insects, frogs, young rabbits, field-mice, &c., as well as upon the eggs and young of partridges and pheasants, &c. It is said to attack the nests of the wild-bee, plundering the store of honey, and also devouring the larvæ, without dread of the stings of the enraged insects, which cannot penetrate its thick tough skin.

The badger measures about two feet three inches in the length of the head and body, that of the tail being seven inches and a half. The head is long and pointed, the ears close, the body broad, stout, and low, the hair trailing along the ground as the animal moves along. The fur is full, coarse, and deep ; its general colour above is brownish gray, lighter on the sides and tail : the under parts are black, as are also the legs and feet. The head is white, with a black stripe extending from the shoulder over the ear and eye almost to the muzzle. (Fig. 79.) From its colour, this animal is in some parts called the gray ; its old Anglo-Saxon name is Broc, a



78.—Teeth of Bauger.

word still retained in Scotland and the adjacent counties of England. It has a glandular subcaudal pouch. The badger is by no means active or alert, and is generally observed to be very fat, as is the case with most animals that lead a tranquil indolent life, and feed upon vege-

table as well as animal diet. It is nowhere very common, especially in the more cultivated countries, where the woods are thinned and its solitudes invaded by the axe.



79.—Common Badger.

The female produces from three to five young in the summer, having prepared a nest in her deep burrow for their reception. They are nursed for five or six weeks, and then begin to shift for themselves. When taken at an early age, the badger may be tamed with little trouble, and soon becomes playful, and much attached to its keepers. Though harmless, and indisposed to enter unnecessarily into a combat, yet it shows when assaulted great spirit and resolution, and is no mean antagonist for a dog twice its own weight to grapple with; its general muscular power is great: its skin is loose and tough, and well protected by coarse shaggy fur, and its bite is dreadfully severe; indeed the jaws are endowed with astonishing strength, and the lower one at its joint or hinge with the skull is so locked as to be inseparable, the cavity into which the condyle is fitted being modified in such a

manner as to retain it permanently in its place. From its prowess and bodily qualifications the badger was formerly in much request for the brutal sport of baiting, a favourite and exciting pastime, gratifying to those who are indifferent to the pain they inflict and incapable of purer pleasures.

The skin of the badger is not without value in commerce. It makes excellent pistol-holsters, and the hair is used for painters' brushes and various other purposes. The flesh, or at least the hams of this animal are said to be palatable, and to resemble those of the bear, for which a relish has been felt or affected by sportsmen epicures. In China the badger, as "Honest John Bell" the traveller states, may be seen in the meat-markets by dozens. In America a species of badger, the *Meles Labradorica*, is widely spread; this species, according to some naturalists, forms the type of a distinct genus (*Taxidea*, Waterhouse; see 'Proceedings of the Zoological Society,' 1838, p. 153).

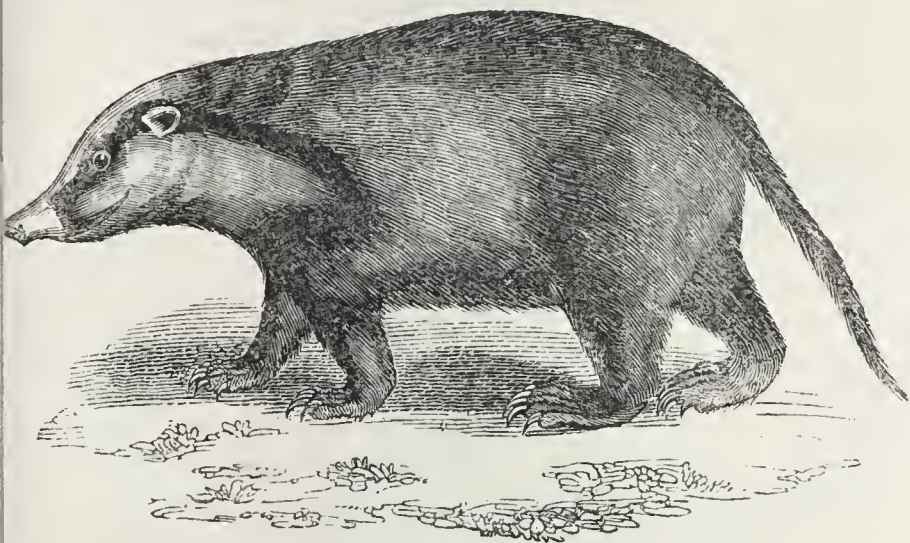
THE INDIAN BADGER

(*Arctonyx collaris*, F. Cuv.; *Meles collaris*; Balloo-soor, Hindustanee).

This animal was first described and figured by Bewick, in his 'History of Quadrupeds' (from a living specimen kept in the Tower about the year 1790), under the title of Sand-Bear. Bewick at once recognised its affinity to the badger, but ignorant of the country from which it was brought, suspected it to be the white badger of North America described by Brisson; a mistake we may readily pardon. Not aware that any English writer had described it, Duvaucel, who saw two individuals at Barrackpore, in the menagerie of the governor-general, considered the species as altogether new. Fred. Cuvier regarded it as the type of a distinct genus.

The size of the sand-hog, for such is the meaning of the term Balloo-soor (not Bali-saur, as Duvaucel writes it, nor Bhalloo-soor, which signifies bear-pig), is that of a badger, but it stands higher on the legs, and its snout is elongated and truncated at the extremity like that of a

hog. The ears are small, covered with hair, and surrounded by a circle of white. The muzzle is flesh-coloured, and nearly naked; two black bands run on each side of the head, and unite near the muzzle; the larger of these bands on each side passes round the eye to the ear, and along the neck and shoulder, to unite with the black colour prevailing on the fore-limbs. The general colour of the body above is yellowish white, the hairs on the back being coarse and tipped with black. The under surface is very thinly clothed, and the tail resembles that of a hog. The toes (five on each foot) are united together their whole length, and armed with large strong claws adapted for digging. (Fig. 80.) Of the habits of this



80.—Indian Badger.

animal in its natural condition little is known. The individuals, a male and female, observed in the menagerie of the governor-general at Barraekpore by Duvaucel, were remarkably shy and wild. The female, however, was less savage than the male, and showed a certain degree of intelligence, which gave reason to believe that, if taken young, this animal might be easily domesticated. They passed the greater part of the day buried beneath the straw of their den, in deep sleep. All their move-

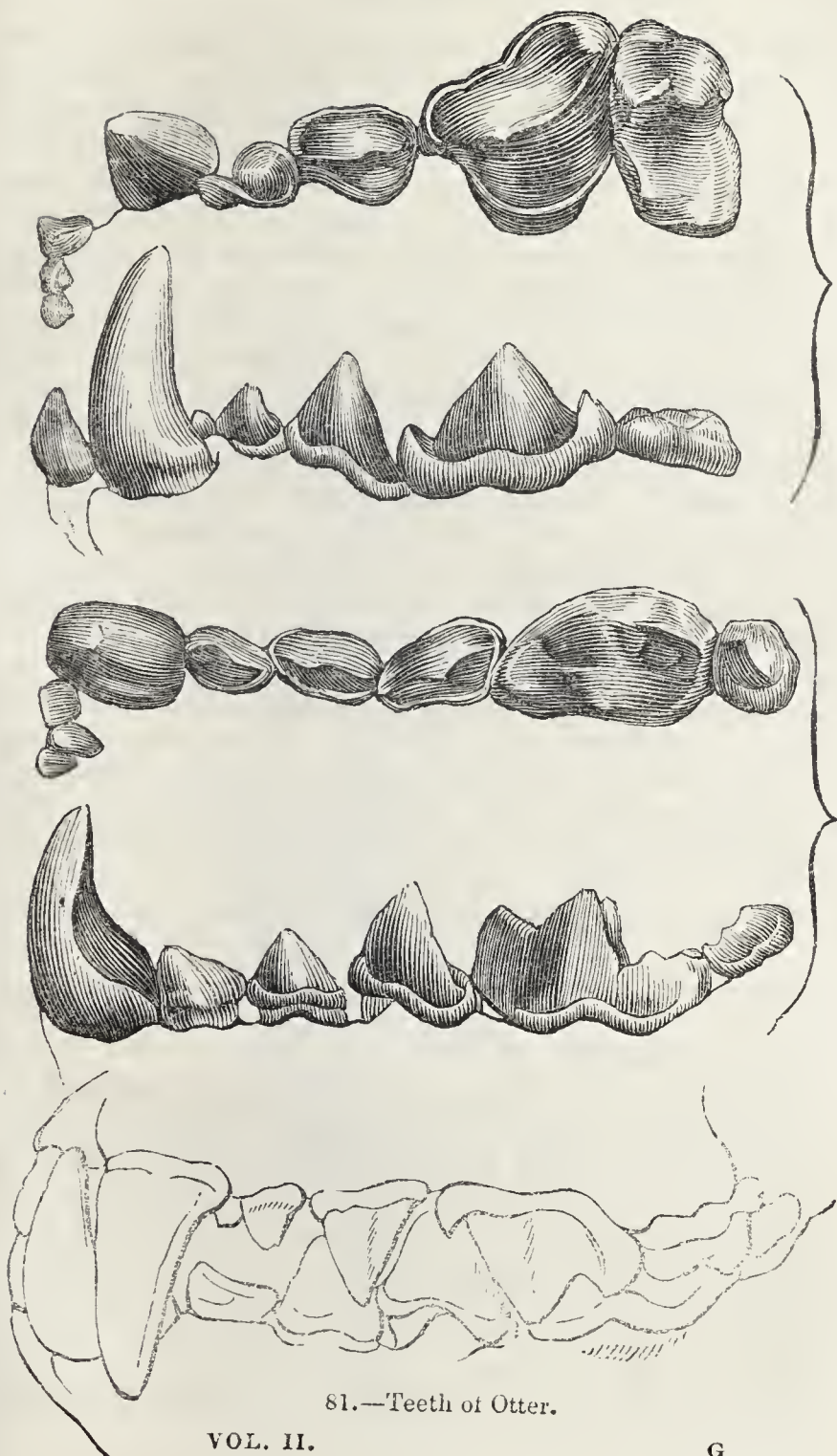
ments were remarkably slow. Though they did not altogether refuse animal food, yet they exhibited a marked predilection for bread, fruits, and other substances of a vegetable nature. When irritated, they uttered a peculiar kind of grunting noise, and bristled up the hair of their back: if still further tormented, they would raise themselves upon their hind-legs like a bear, and appeared, like that animal, to possess a power in their arms and claws not less formidable than their teeth. 'This is confirmed by Mr. Johnson, in his 'Sketches of Indian Field-sports.' "Badgers in India," says he, "are marked exactly like those in England, but they are larger and taller, are exceedingly fierce, and will attack a number of dogs. I have seen dogs that would attack a hyæna or wolf afraid to encounter them. They are scarce, but occasionally to be met with among the hills."

THE OTTER (*Lutra vulgaris*; *Mustela Lutra*, Linn.).

This, there can be little doubt, is the *ἐνυδρίς* (Enhydriis) of Aristotle and the Greeks, and the *Lutra* of the ancient Italians. It is the *Lodra*, *Lodria*, and *Lontra* of the modern Italians: *Nutria* and *Lutra* of the Spanish; *Loutre* of the French; *Otter* and *Fisch-Otter* of the Germans; *Otter* of the Dutch; *Utter* of the Swedes; *Odder* of the Danes; *Dyfigi* of the Welsh; *Balgair*, *Cu-donn* (Brown Dog), and *Matadh* of the Northern Celts; and *Otter* of the modern British.

On introducing the otter to notice, we may observe that these animals seem to conduct the *Mustelidæ* to the seals; though it must be confessed the dentition of the latter is modified on a different and peculiar type. The otters in fact constitute an aquatic group of the *Mustelæ*; indeed many of the true weasels resort occasionally to the water in quest of prey; the *Vision* of North America (*Mustela vision*), and a near ally, the *Mustela lutreola* of northern Europe and Asia, for example, are aquatic and otter-like in their habits; and approximate to the otter in form.

The otters are distinguished by the peculiar breadth



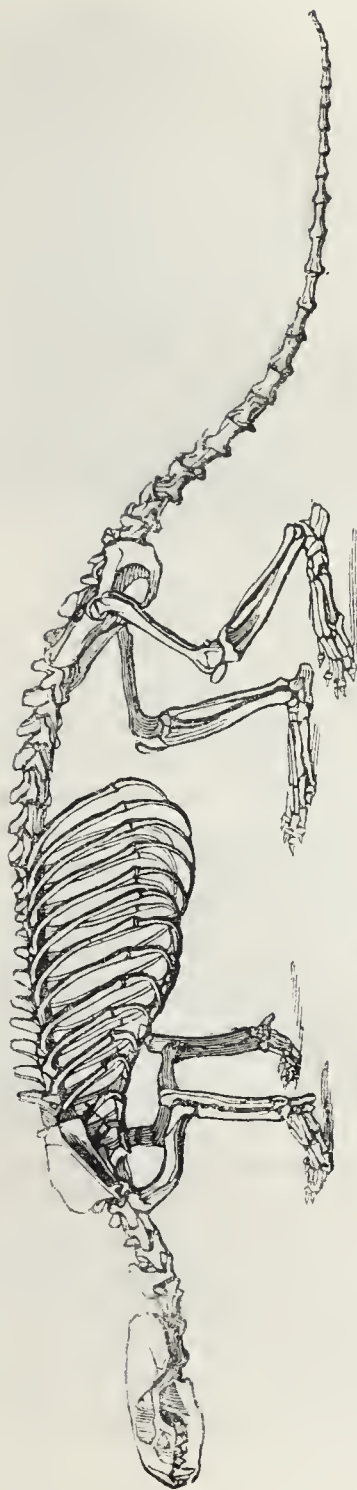
81.—Teeth of Otter.

and flatness of the head, and the rounded outline of the muzzle; the lips being large and fleshy, and furnished with strong whiskers, which are evidently the communicators of feeling; the ears are very small and close to the skull; and the eyes, of moderate size, are provided with a nictitating membrane as a defence to their surface. The tail, which in most aquatic mammalia is an important instrument, is long, but very stout and muscular at the base, somewhat compressed horizontally, and tapering gradually to the extremity. In swimming and diving it is used as a rudder, enabling the animal to turn rapidly and abruptly, and assisting it to perform its varied and graceful manœuvres while in chase of its finny prey. The tongue is somewhat rough. The body is elongated and flattened, and the limbs are short and stout: the toes (five on each foot) are webbed, and spreading; the soles are naked. On land the progression of the otter is plantigrade, and by no means free or rapid: hence it trusts to the water for safety, making to it when attacked or in any danger. The fur of these animals at once indicates their aquatic habits; it is close, short, and fine, consisting of a thick woolly undercoat and an upper layer of smooth glossy hairs. In their dentition (Fig. 81) the otters differ little from the polecats, martens, and skunks,

the false molars being $\frac{3-3}{3-3}$; carnassières, $\frac{1-1}{1-1}$; tuber-

culous, $\frac{1-1}{1-1}$. Fig. 82 represents the skeleton of the common European Otter.

This well-known species is by no means confined to the lakes and rivers of Europe, but abounds also on many parts of the coast, and is common on the shores of Scotland and Ireland, as well as on the rocky Hebrides and Shetland Islands, where it dwells in hollows and caverns (Fig. 83), going out to sea to fish, or entering the mouths of rivers, and making sad havoc among the salmon, on which account, in Antrim, where it hides among the basaltic masses on the east coast, a price is set upon its head. The otter is nocturnal, night being the period in which



82.—Skeleton of European River-Otter.



83.—Otter in Cave.

it carries on its work of slaughter: sly and recluse, it lurks by day in its deep burrow, the mouth of which is concealed among masses of stone, the luxuriant herbage of some steep bank which overhangs the water, or beneath the twisted roots of an overshadowing tree.

The movements of the otter in the water are remarkably graceful, and it swims at every depth with great velocity; every now and then it comes for a moment to the surface to breathe, previously expelling the air pent up in its lungs, which rising in bubbles marks its sub-aquatic course. Having taken breath afresh, it dives noiselessly like a shot, and gives chase to its prey, which it follows through every turn and maze, till at length the exhausted victim can no longer evade the jaws of its rapacious foe. Whoever has witnessed the feeding of those which from time to time have been kept in the gardens of the Zoological Society cannot fail to have remarked the fine sweep of the body as the animal plunges into the water, its undulating movements while exploring its prey, the swiftness and pertinacity of the pursuit, and then the easy turn to the surface with the captured booty. This is generally devoured before the chase of another

fish is commenced ; sometimes, however, instead of treating them thus separately, the otter contrives to bring up several at a time, managing not only to seize them, but to carry them hanging from its mouth. In eating them it commences with the head, which it crushes in an instant between its teeth. Eight or ten moderate-sized fish serve for a single meal, but it is well known that in a state of nature the otter slaughters a much larger number of fish than it devours : hence some idea may be formed of the havoc occasioned by a pair of otters in support of themselves and their young. Indeed, the animal seldom devours more of a fish than the head and upper portion of the body. When fish is scarce, the otter will feed on frogs and water-rats. Mr. Bell informs us that, “ when driven by a scanty supply of fish, it has been known to resort far inland to the neighbourhood of the farm-yard, and attack lambs, sucking-pigs, and poultry, thus assuming for a time the habits of its more ter-



84.—Otter.



85.—Otter.

restrial congeners.” In winter, when the smaller streams and ponds are frozen, the otter wanders in search of places in the river, the depth of which secures them against the effects of the frost, or travels down the smaller streams to the large river into which they merge, and there continues its work of destruction. (Figs. 84 and 85.)

It is during the spring and summer months, while the young of the otter are dependent upon the mother's care, that the destruction she makes among the fish is most considerable ; she has not only her own wants, but those of her offspring, to provide for, and her exertions during the silent hours of night are unremitting. The track she leaves in the mud or the soft soil on the water's edge, as she goes to and from her retreat, witnesses the extent of her labours, and also their success : a fish-preserve, if near her haunt, at this season suffers immensely from her depredations, and is certain to be visited night after night until none but the smaller fry remain. The mill-dams of trout-streams are also favourite fishing-places of this

cunning animal, and are often sadly thinned of the finest fish. Nor is the injury done by the otter confined to the mere destruction of fish for food; its presence militates against their increase, inasmuch as they are scared by their enemy from their spawning-places, and prevented from depositing their spawn so as to secure the vivification of the ova, to the mortification of all "honest anglers." Izaak Walton says "an otter will sometimes go five or six or ten miles a-night to catch for her young ones, or glut herself with fish;" but it also as often happens that, where the otter finds a piece of water replete with prey, it there takes up its abode, and perhaps carries on for weeks, unsuspected, its depredations. Independently, however, of the footsteps of the otter betraying its residence in the vicinity, the circumstance of its always voiding its spraint, or dung, on one spot often leads to its discovery; the undigested remains of fish, their bones and scales, denote the nature of their devourer; and the alarm of an otter in the neighbourhood is soon followed by a search for the delinquent.

Otter-hunting was among the favourite field-sports of our ancestors, and is still eagerly carried on in the islands of Scotland, where the difficulties of the chase, from the rocky, broken nature of the shore, add to the excitement.

The otter is intelligent, and when taken young easily tamed, and may be taught to assist the fisherman, by driving shoals to the nets, or by catching salmon. Daniel, Bewick, Shaw, and Goldsmith record instances in which the otter has been domesticated, as do also Mr. Bell and Mr. Macgillivray; the late Bishop Heber noticed in India, on one occasion, a number of otters tethered by long strings to bamboo stakes on the water's edge, and was informed that it was customary to keep them tame in consequence of their utility in driving the shoals of fish into the nets, as well as of bringing out the larger fish with their teeth.

The common European otter measures about two feet two inches in the length of the head and body, the tail being one foot four inches. Its usual weight is from twenty to twenty-four pounds, but instances have been

known in which it has attained the weight of forty pounds. Those that frequent the sea-coast are generally larger and darker coloured than the otters of inland rivers or sheets of water. The female produces from three to five young, and is devoted to them, nursing them with the greatest assiduity.

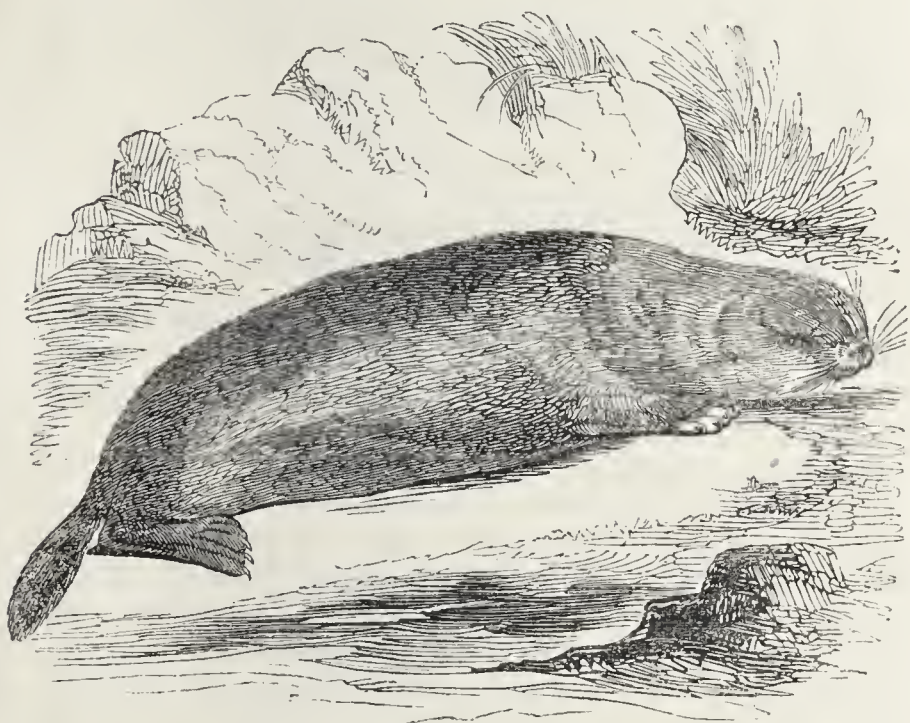
A variety, spotted with white, is sometimes seen ; this is regarded by the Scotch peasantry as the king of the otters, and they hold that it bears a charmed life, and is never killed without the sudden death of some man or other animal at the instant it expires itself. The skin is considered as a sure preservative from infection, wounds, and dangers of the sea.

THE SEA-OTTER

(*Enhydra marina*, Fleming ; *Lutra marina*, Steller ; *Mustela Lutris*, Linn. ; *Enhydriis Stelleri*, Fischer ; Kalan of the natives of Kamtchatka).

This remarkable animal in many respects approaches nearer the seals than the otters of the genus *Lutra*, and may be regarded as an immediate link between the two groups. We have fortunately been enabled to examine its skeleton (see 'Zool. Proceeds.,' 1836, p. 59), which to the comparative anatomist presents characters of great interest. The muzzle in the sea-otter is blunt and short, the ears are rounded, the body cylindrical, the fore limbs are extremely short, the paws small and impacted in skin to the end of the toes, the sole being naked and granular. The hind legs are short, but placed as far back as possible ; the thigh-bone is thick, with a round head, destitute, as in the seals, of the ligamentum teres ; the hind foot or paddle is of great length and breadth ; and the toes (five in number) are regularly graduated from the inner, which is the smallest, to the outer toe, which is the longest and stoutest : they are all united by webs to the very tip. The claws are small. The dentition is as follows :—Incisors, $\frac{6}{4}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{4-4}{5-5}$. Of

the molars above, the first is very small and conical ; the second is larger ; the third, or carnassière, is large and compressed, with three rounded tubercles on its surface ; the last molar is still larger, flat, with a slightly elevated and rounded edge. Of the five molars below, the three first increase gradually in size ; the fourth is large and flat, with three small and rounded tubercles ; the last is small and flat (Fig. 86).



86.—Sea-Otter.

The tail is rather short, and, when the hinder paddles are stretched out in the act of swimming, this organ will appear placed between them almost as much as it is in the seals.

The sea-otter is a native of the north-west coast of America, from California to latitude 60°, and of the opposite coast of Asia, from the Yellow Sea to the north of Kamtchatka and the intermediate islands. Its fur, which is of a black colour, sometimes chestnut-brown, and oc-

asionally even yellow, is soft, full, and beautiful, and is an object of commerce, being procured by the Russians for the Chinese market, where it sells for a high price.

This animal haunts sea-washed rocks, and lives mostly in the water, where it procures its food, which consists of fish, and, as is indicated by the characters of the teeth, which are evidently formed for bruising hard substances, shelled mollusks, and crustacea. In summer the sea-otter often ascends the rivers to the inland lakes. The female produces on land a single cub. The average length of this species is three feet, exclusive of the tail, which measures about ten inches.



ORDER—INSECTIVORA.

THE animals of this order, as the name implies, are specially appointed to check the overwhelming increase of the insect world, to assist in the work of warfare against hordes of beings individually insignificant, but which, if permitted to multiply uncontrolled, would render the labours of man fruitless. Insects, and especially their larvæ, with slugs, worms, and other creeping things, constitute their food. It is not among the Insectivora that we are to look for the powerful, the fierce, and the terrific. Timid little creatures, they neither alarm us by their presence, nor force themselves upon our notice by their powers or ferocity. Of unobtrusive habits, they elude our cursory observation. They flee from our approach, and they remain in concealment till man withdraws from his labours in the evening, and leaves field and woodland to their revels and enjoyments. Hence it is that their manners and instincts are neither very generally nor very definitely understood. It is true that the structure of their teeth, of which the molars are crowned with sharp elevations, declare the nature of their food, at least to the eye of the naturalist—and that of many, as the mole, their general organization would lead us to infer certain modes of life; but beyond these points the ob-

servation of the animals themselves, living and in the enjoyment of freedom, must instruct us, for by this alone can their nicer instinctive peculiarities be ascertained.

THE COMMON SHREW

(*Sorex tetragonurus*). *Sorex araneus*, Bell; but not of the continental authors.

The Shrews (genus *Sorex*, divided by Duvernoy into three subgenera, viz. *Sorex*, *Hydrosorex*, *Amphisorex*) constitute a numerous group of little animals, still in much confusion, partly owing to the difficulty of determining the species, and partly to the contrary specific titles which have been given to many of the European species by British and continental naturalists; the latter points, indeed, have been recently cleared up by the Rev. L. Jenyns, who has also added some new species to the British list.

In the genus *Sorex*, including the subgenera, the dentition is as follows:—Middle incisors, $\frac{2}{2}$; lateral incisors,

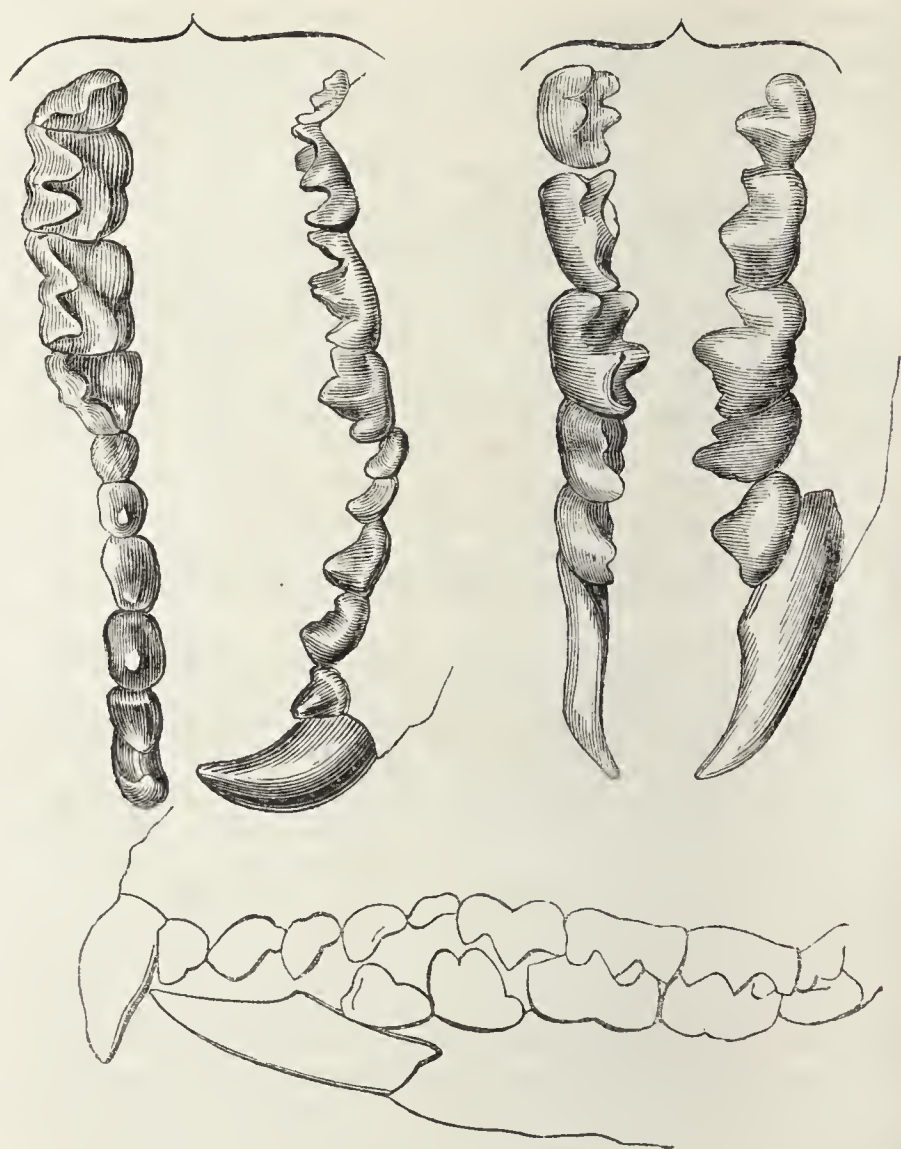
or false molars (in *Sorex*), $\frac{3-3}{3-3}$ or $\frac{4-4}{4-4}$; (in *Hydro-*

sorex), $\frac{5-5}{2-2}$; (in *Amphisorex*), $\frac{4-4}{2-2}$; canines, $\frac{0-0}{0-0}$;

molars, $\frac{4-4}{3-3}$. The true or middle incisors are much

produced; the upper ones are curved and notched at the base; the lower ones are almost horizontal, with a smooth edge in *Sorex*, a denticulated edge in *Hydrosorex*, and a smooth edge; but in this subgenus the two first false molars above are of equal size, while in *Sorex* they diminish rapidly in size from the first to the last. Fig. 87 represents the dentition of a species of shrew taken in the Mauritius, six times larger than nature.

The shrews may be known by their long, taper, moveable snout, their velvety fur, and their extremely minute eyes, almost hidden in the surrounding hairs; the ears are small and close; the tail moderately long; and a



87.—Teeth of Shrew.

musky odour is exhaled from small glandular orifices, surrounded by stiff close hairs, situated on the sides of the body. This odour renders the shrews distasteful to the cat (though the latter readily destroys them), but not to weasels, hawks, or owls, which are great enemies to these little nocturnal insectivora.

The common shrew is of a reddish mouse-colour, paler beneath ; the tail is quadrangular in adults, rather shorter than the body, and not eiliated beneath. Length of head and body, two inches seven lines ; of the tail, one inch ten lines. (Figs. 88 and 89.)



88.—Common Shrew.

This little animal is common in our island, frequenting tufted banks, hedgerows, thiekets, gardens, farm-yards, &c., and feeding on worms, and insects, eaterpillars, &c., after whieh it grubs with its long pointed snout among the elose herbage or under the soft loose soil. It is very impatient of hunger, and extremely pugnaeious, two seldom meeting without engaging in combat ; and if two be confined together in a box, the weaker falls a prey to the stronger and is soon partially devoured. Many are killed and eaten by the mole, and in August numbers are often found dead in the lanes, and pathways across the fields, but to what cause their destruction is owing, at the season in question, is not very apparent. As was the ease with the hedgehog and some other animals, superstition and ignorance have attributed the most baneful properties to the shrew ; it was supposed by our an-

cestors to paralyze the limbs of cattle by merely creeping over them, afflicting them with excruciating torments, and to poison them by its bite. Aristotle, Pliny, and Agricola also attribute poisonous effects to the bite of the shrew, which, as they assert, produces tumours and ulcerations. Agricola states that the Latins called the animal *musaraneus* from its injecting venom into the wound it makes, as does the spider (*aranea*), and he notices the characters of the teeth, and quadrifid figure of the wound they inflict, adding that in warm regions the wound is generally pestiferous, but not in cold climates; his remedial prescription is to place the body of the shrew cut asunder on the injured part. Among our ancestors the remedies were to make the person or animal pass through the arch of a bramble rooted at both ends, or to



89.—Common Shrew.

apply to the limbs of suffering cattle the twigs or leaves of a shrew-ash, that is, an ash into the trunk of which a deep hole had been bored, and a poor devoted shrew plugged in alive.

The voice of the shrew is a shrill, feeble, chirring cry, which may be often heard when the animal is unseen: we have known persons whose ears were unable to catch it, however attentively they have listened, though of other tones they were perfectly susceptible.

The shrew makes long superficial burrows in banks and among the roots of trees and brushwood; the female makes a nest in her retreat of soft herbage, with an aperture at the sides; she breeds in the spring, producing from five to seven young.

THE WATER-SHREW.

The water-shrew is of a rich velvety brownish black above, and of a nearly pure white beneath, the colours being abruptly separated; the sides of the feet and the under surface of the tail are ciliated or fringed with long, stiff, white hairs. Length of head and body, three inches three lines; of the tail, two inches one line.

This elegant little animal is aquatic in its habits; frequenting clear fresh-water ditches and brooks, in the banks of which it makes extensive burrows; it swims and dives with great address, the sides being spread out, the belly flattened, and the tail extended as a rudder. When diving, the black velvety coat of the animal appears as if beautifully silvered, from the innumerable bubbles of air that cover it. These are pressed out of the fur, which repels the water, the animal being quite dry when it emerges. It has the power of completely closing the orifices of the ears, so as to exclude the water while beneath the surface. These little water-shrews form colonies in certain spots, making runs or tracks along the banks, leading from their subterranean dwellings to the water; when two meet in these, or while

swimming about, they utter their shrill, feeble, querulous cry, perhaps a token of recognition. The water-shrew, though only recognised as a native of our island within the last few years, is not uncommon in most of our counties, and has been captured in Scotland and Devonshire.

These shrews live for the most part "in the banks of rivulets and spring-water ditches, and appear to collect their food, which probably consists of the larvæ of the ephemeral flies, from among the loose mud. If cautiously watched, they may be seen crouching at the mouths of their holes, looking intently on the water. Should a shoal of minnows or stickle-backs pass near, the shrew plunges amongst them, but seldom succeeds in making a capture; and, retiring to his station, looks out for another chance. When pursued by the weasel, they drop into the water, and pass to the other side." These water-shrews are evidently gregarious in their habits, and are very lively and sportive; they feed on aquatic insects, and on such as are accidentally drowned; they root amidst the leaves and mud with their long noses, in search of food, with great earnestness and perseverance, or pursue their insect prey in the water, as the otter gives chase to fish, and with the same determination. They dwell in extensive shallow burrows, excavated in the bank sides. The female breeds in spring, producing from five to seven young at a birth. Their note is a short, shrill, feeble sibilation.

In the 'Magazine of Natural History' for March, 1840, is an interesting account of the water-shrew, by Dr. Barnard Clarke:—"Whilst walking," he says, "by the side of the river Gipping, in May, 1838, between Ipswich and the village of Sproughton, my attention was arrested by several water-shrews actively engaged in a dyke that runs parallel to the river. These little creatures were in such rapid motion on the water, that its surface was thrown into a state of quick undulation, though the dyke was at least four feet wide. At times they would be upon the surface, moving at a rapid rate between the blades of the aquatic plants, consisting

principally of *Sparganium ramosum* and *simplex*, that grew from the bottom: Then they would dive, and for a while remain beneath; but always, on returning to the top, displaying the greatest rapidity in their movements. Whilst above water, they were constantly repeating their faint though shrill tremulous squeak, which appeared as though expressive of pleasurable sensations. On visiting the spot the following evening, and secret-ing myself, I had the opportunity of remarking the movements of these little animals on land. I found beneath a slightly hanging bank, and close by the water-side, a long gallery, which, though in a great measure naturally formed, yet had been much laboured at by the shrews to render it a convenient viaduct between one hunting-place and another: the grasses and other plants had been removed, as well as here and there small portions of earth, in order to render this passage, in their movements from end to end, as commodious as possible. I observed the shrews continually passing backwards and forwards through this passage, which enabled them to travel with facility from one part of the ditch to another, and which was principally a little above the water-level, but at intervals there were depressions at which the water passes on to or over its floor. This passage was evidently the common property of many shrews, as several were continually running backwards and forwards along its whole extent, and ultimately taking to the water, swimming up and down the ditch, diving, and performing various evolutions in search of their insect prey.

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On emerging from the water, the coat appears perfectly dry, but this is further insured by the little creature giving itself a sudden shake on arriving at its landing-place. I remarked that, in travelling along the above-mentioned gallery, the tremulous shriek is always heard when two shrews happen to pass each other, and the same thing occurs, though not so invariably, in their

movements in the water. When a shrew secured an insect, it quitted the water, and ascended a convenient stone, or the projecting root of a tree, a clod of earth, or some similar body, where at leisure it devoured its prize, steadying the insect with its fore paws, while it nibbled it with the greatest enjoyment. I once traced a pair of shrews into a small hole in a bank by the side of a ditch, where I had been in the habit of observing them; and in order to try and secure them, I carefully removed the earth, when I found that, although the entrance was scarcely larger than just to allow of two shrews passing together, it led into a very capacious vestibule, with galleries leading one into another, and so extensive that there was no possibility of ascertaining their full extent without removing the greater portion of the bank."

THE OARED SHREW.

A species termed the Oared Shrew (*Sorex ciliatus*, Sowerby; *Sorex remifer*, Geoffroy) is by most naturalists regarded as distinct, though allied to the Water-Shrew, which it appears to resemble in habits. According to Mr. Yarrell ('Zoological Proceedings,' 1832) the Oared Shrew is distinguishable from the more common Water-Shrew by its greater size and uniform colour; the whole of the upper part of the head, the body, and sides are velvet black; the situation of the ear is marked by a tuft of white hairs, more conspicuous than in the Water-Shrew from the greater contrast of colour. There is a small patch of light brown under the lower jaw; the under surface of the body is rusty black, and the tail is black with a line of pendent grayish-white hairs along its under surface. Dr. Scougal, of Glasgow, states that the Oared Shrew is not uncommon in the neighbourhood of that city, and three specimens were recognised by Dr. Hooker as similar in every respect to the Water-Shrew which he had procured in Norfolk. But then, was not this Water-Shrew the *S. bicolor* or *fodiens*? In the

'Annals of Natural History' for June, 1841, the Reverend Mr. Jenyns observes, "I have seen so many intermediate specimens between this (the Oared Shrew) and the Water-Shrew, that I consider it extremely doubtful whether they be distinct." And he leaves the point as one requiring to be more fully investigated by anatomical comparisons.

Mr. Bell gives the measurement of the Oared Shrew as three inches two lines for the length of the head and body; for the tail two inches one line. Fig. 90 represents the under surface of the hinder feet of—*a*, the common shrew; *b*, the water-shrew; *c*, the oared shrew.



90.—Feet of Shrews.

It would appear that other species of Shrew, besides those we have described, are indigenous in our island. Of these, one which is common in Ireland is termed, by Mr. Jenyns, *Sorex Hibernicus*; to this he had previously applied the title of *rusticus*, having found it in England, while he regarded the Irish Shrew as distinct: but since they have been proved to be the same, he requests "that the name of *Hibernicus* be hereafter adopted for this species, which, though not confined to Ireland, seems to be the common species in that country, and is much more abundant there than in England, where it gives place in a great measure to the *S. tetragonurus*. It has been observed in different localities in Ireland, and one specimen, sent me by Mr. Thompson, was stated to have been taken in the county of Antrim, at an ele-

vation of 1200 feet above the level of the sea.”—‘Ann. and Mag. Zoology,’ &c., June, 1841, p. 263.

Another species is described by Mr. Jenyns as the Chestnut Shrew (*Sorex castaneus*), of a bright rufous colour: it is closely allied to the Common Shrew, and may perhaps be only a variety.

The number of foreign shrews is very great, but in habits and manners they resemble those of the British islands, their destined work being to thin, in conjunction with other insectivora, the innumerable hosts of insects and small “creeping things” which teem upon the surface of the earth. Was it from this cause that the shrew was among the consecrated animals of the ancient Egyptians? For, strange to say, the mummies of two distinct species have been, after the lapse of so many centuries, discovered in a good state of preservation in the crypts of Thebes and Memphis. Of these, one is the *Sorex giganteus* of Isidore Geoffroy, the *Grande Musaraigne* of Geoffroy, in the ‘Catalogue raisonné de M. Passalacqua’ (Olivier, ‘Voyage en Egypte’). The other is a species of small size, termed, by M. Isidore Geoffroy, *Sorex religiosus*. Of this no fewer than twenty well-preserved specimens exist in the collection of Egyptian antiquities at Paris, belonging to M. Passalacqua. Of this species we have met with no detailed description, nor are we aware that its living prototype is ascertained. From the divine honours paid to it by the superstitious Egyptians, it has received the appellation *religiosus*. The Shrew, called by the Greeks *Mygale*, was, as we are informed by ancient authors, especially worshipped in the Athribitic nome (or district) of Egypt, and that it was sacred to, and considered as the mundane representation of, Latona. The supposed blindness of this animal is alleged to have been the cause of its dedication to one of the deities of darkness and concealment.

THE DESMAN (*Mygale moschata*).

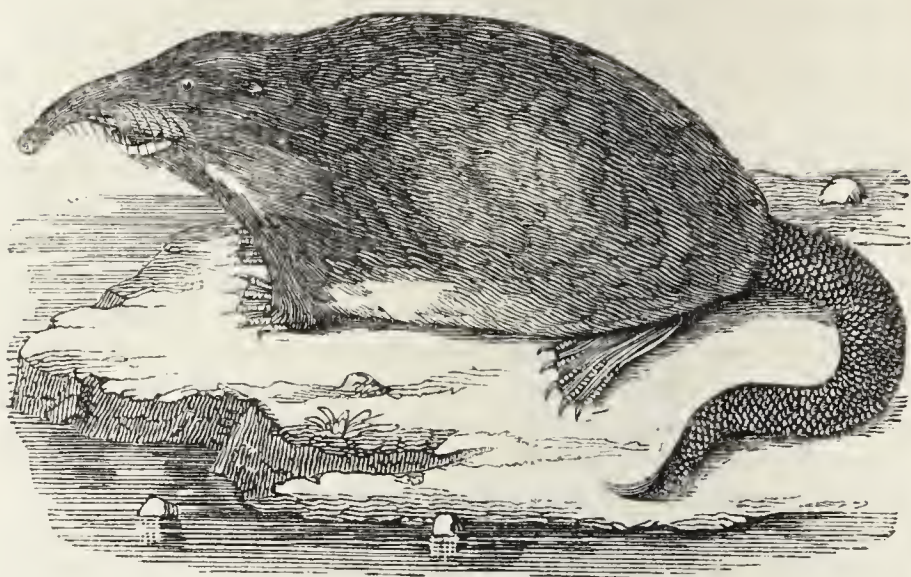
Biesamratze of the Germans; Wychozol of the Russians. The genus *Mygale*, Cuv. (*Myogalla*, Fischer; *Castor*

moschatus, Linn.), presents us with the following dental characters :—Incisors, $\frac{2}{8}$; canines, $\frac{0-0}{0-0}$; molars, $\frac{10-10}{7-7}$; of the molars, the first seven on each side above, and the first four below, are false; between the two large incisors below are two minute teeth, and the two upper incisors are flattened and triangular. See Fig. 91 for the teeth of the upper jaw. In these animals the snout is elongated into a flexible proboscis furrowed down the middle, which they are incessantly turning about; the tail is long, thick, scaly, and compressed at the sides; the eyes are very small; external ears wanting; the fur is full, deep, soft, and glossy, like that of the beaver; the feet are broad and completely webbed, toes five in number (Fig. 92). Two species are known, both aquatic in their habits; the one is the desman or musk-rat of Russia; the other, a smaller species, is found in the Pyrenees.



91.—Teeth of Desman.

The desman measures upwards of ten inches in the length of the head and body, that of the tail being seven (from specimen in Paris Museum). This beaver-like aquatic shrew is abundant in the lakes and rivers of Southern Russia, feeding on worms, aquatic insects, fish,



92.—Desman.

and especially leeches, which it searches for in the mud at the bottom of the water with its long flexible snout. Its burrow is deeply hollowed out in steep overhanging banks, the entrance being below the level of the water, whence it rises gradually, so as never to be filled during the highest floods. The desman seldom comes on shore voluntarily, but is often captured in the nets of the fishermen; and it is frequently seen swimming about or diving in pursuit of prey. It exhales a strong musky odour, the secretion of small glandular follicles at the root of the tail; and this flavour of musk it communicates to pikes and other fishes which prey upon it, rendering their flesh disgusting.

THE CAPE ELEPHANT-SHREW (*Macroscelides typicus*).

Allied to the shrews are some little animals peculiar to Africa, constituting the genus *Macroscelides* of Dr. A. Smith. They are called elephant-mice or elephant-shrews, from the proboscis-like form of the snout; but the scientific name bears reference to the jerboa-like elongation of the hinder limbs. The dentition is as follows:—

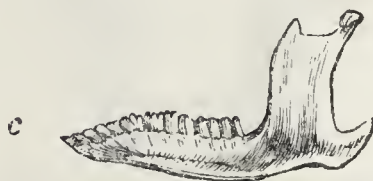
Incisors, $\frac{2-2}{2-2}$; false molars (called canines by Dr. Smith), $\frac{4-4}{4-4}$; molars, $\frac{5-5}{5-5}$. We give the skull and teeth of *Macroscelides*:—Fig. 93 is the upper surface



93.—Upper Surface of Skull of Cape Elephant-Shrew.

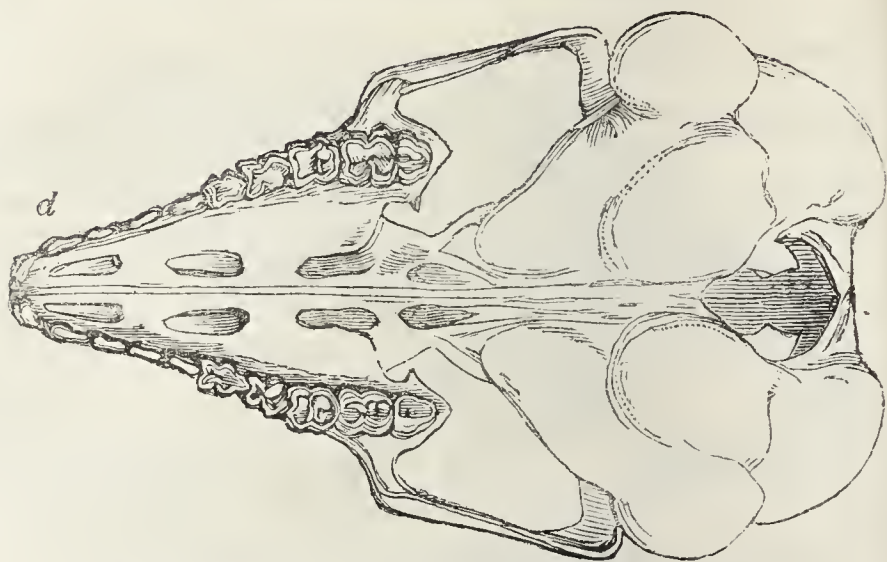


94.—Profile of Upper Part of Skull of Cape Elephant-Shrew.

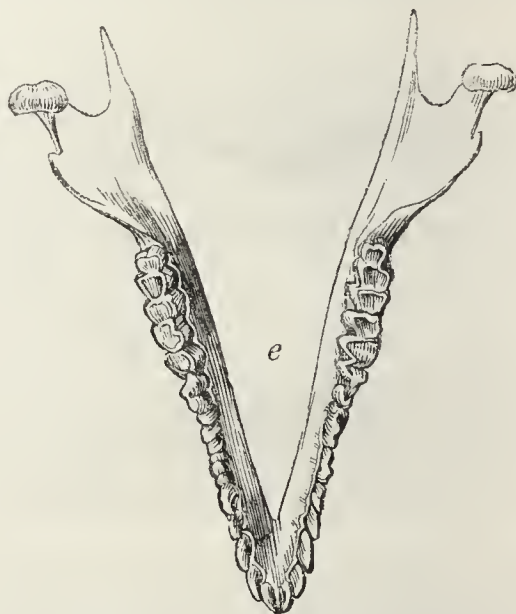


95.—Lower Jaw of Cape Elephant-Shrew.

of the skull, natural size; 94, profile; 95, lower jaw; 96, under surface of the skull, twice the natural size; 97, the lower jaw, twice the natural size. The nostrils are at the apex of the proboscis; the eyes are moderate; the ears large and rounded; the tail rather long and like that of a mouse. Feet five-toed. The Cape elephant-shrew (*Macroscelides typicus*) is the *Sorex araneus maximus* of Petever. The fur is soft and long; the general colour



96.—Under Surface of Skull of Cape Elephant-Shrew.



97.—Lower Jaw of Cape Elephant-Shrew.

is reddish brown, clouded on the back with a darker tint, the under surface white; the ears nearly naked; whiskers long: length of head and body, three inches and three-quarters; of tail, three inches and a quarter (Fig. 98).



98.—Cape Elephant-Shrew.

This curious animal inhabits open plains, and lives in burrows under ground, the passage to which runs for for some distance almost perpendicularly downwards. During the day it seeks its food, and may be seen basking in the heat of the sun, sitting erect on its hinder legs in the full glare of the rays. When disturbed it flies immediately to its subterranean retreat, and with such velocity, that it is impossible to make out its form or general appearance as it skims along. It feeds upon insects. Six or seven species are known peculiar to South Africa; and one a native of Algiers.

THE SOLENODON (*Solenodon paradoxus*).

The genus *Solenodon* of Brandt ('Mém. de l'Acad. Impériale des Sciences de St. Pétersbourg,' tome ii.,

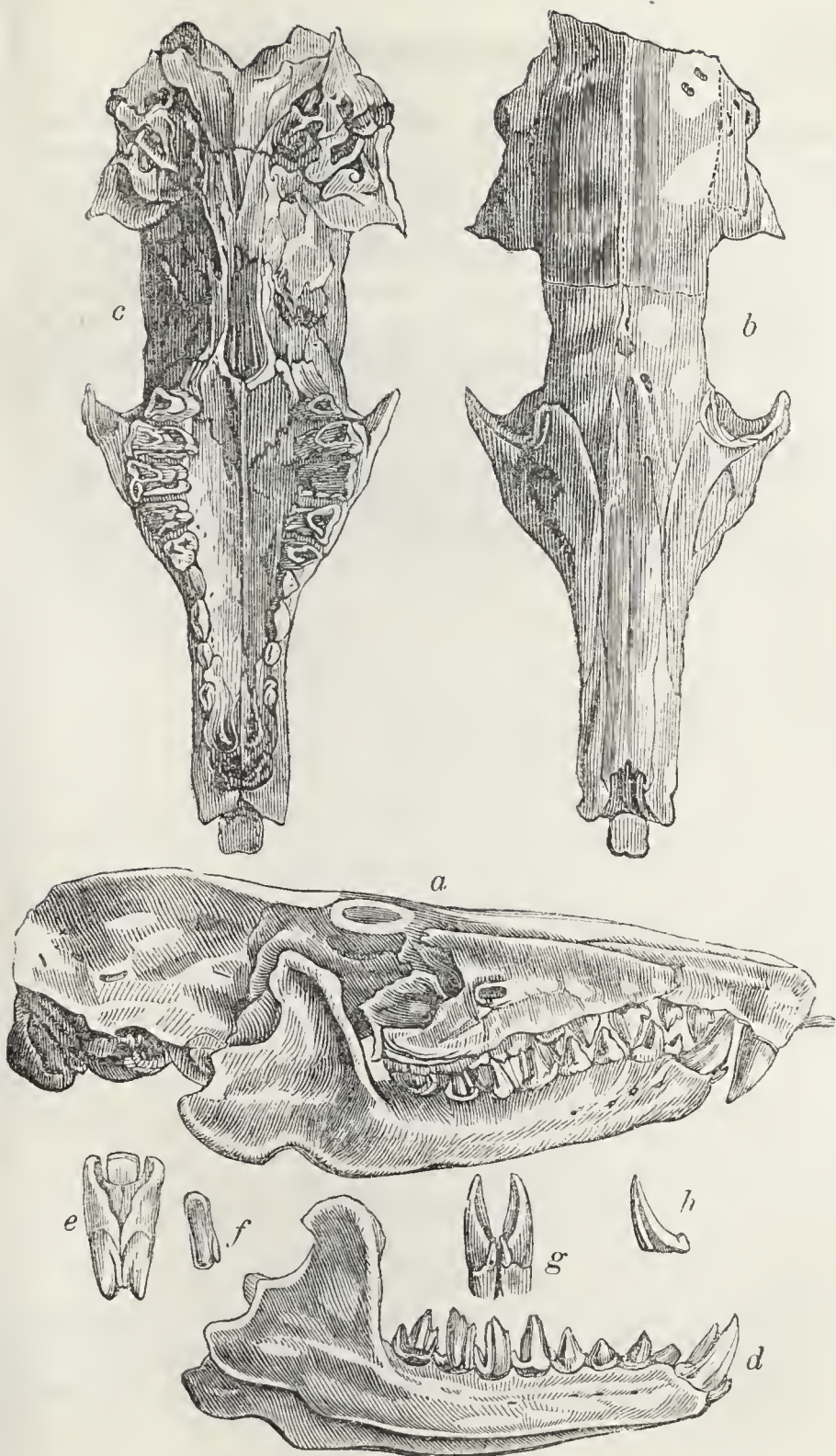
livr. 3ème, 1833) contains, as far as yet known, only one species, an animal peculiar to Hayti, where it is known under the name of *Agouta*. Allied in many respects to the genera *Sorex* and *Mygale*, in the character of the ears, the fur, and the tail it resembles the opossums (*Didelphis*). Its dentition approximates the most nearly to that of *Mygale*. In size the *Solenodon* exceeds a rat; its snout is lengthened into a slender naked proboscis, at the tip of which are the nostrils with a furrow between them; the ears are moderate and rounded; the fur is coarse and long, and of a yellowish red; from the lips and cheeks proceed slender whiskers of great length; the limbs are stout; the toes five on each foot, armed with large hooked claws; the tail is long, rat-like, and scaly, being destitute of hairs. Dentition as

follows:—Incisors, $\frac{6}{6}$; false molars, $\frac{6-6}{6-6}$; true molars,

$\frac{8-8}{8-8}$. The two middle incisors of the upper jaw are

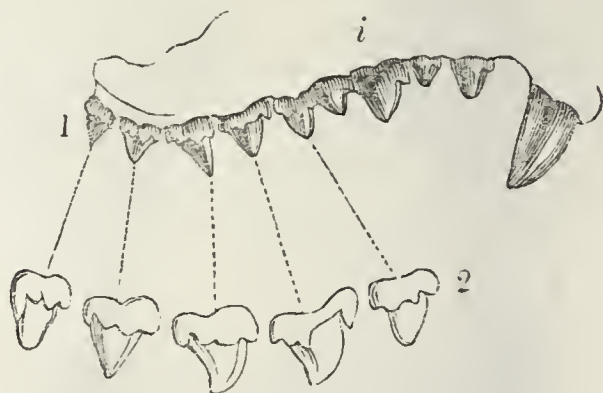
remarkable for their size and the distance between them and the succeeding incisors; they are compressed, pointed, and perpendicular. The zygomatic arch is incomplete, as in the shrews (*Sorex*), the Tenrecs (*Centetes*), the Echinops, &c. Fig. 99 represents the skull and dentition of the solenodon: *a*, skull of solenodon (profile); *b*, seen from above; *c*, seen from below; *d*, mandible or lower jaw; *e*, anterior part of the intermaxillary bone, with the two anterior incisor teeth; *f*, anterior surface of an anterior upper incisor tooth; *g*, anterior parts of the mandible, with the four anterior incisor teeth; *h*, the crown of a second or middle incisor tooth of the mandible, seen on its internal surface and exhibiting its triangular canal. The foregoing figures are nearly of the natural size. Fig. 100: *i*, teeth of the upper jaw seen laterally; 1, 1, nat. size; 2, 2, magnified. (Brandt.) Fig. 101: *a*, the fore foot of solenodon, upper surface; *b*, hind foot, upper surface.

Of the habits of the solenodon little is known: its strong claws and pointed snout, the base of which is sup-

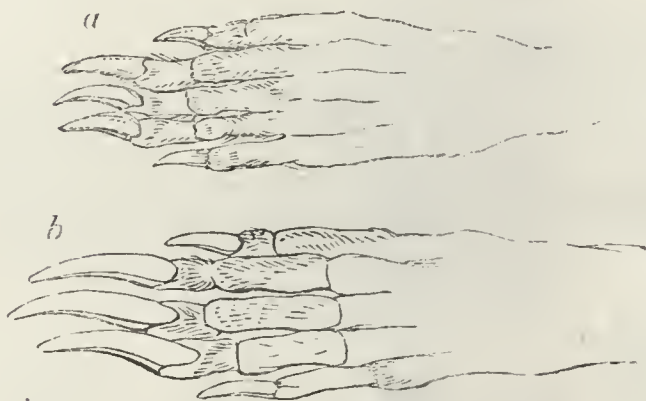


99.—Skull of Solenodon.

ported by a stylet of bone, denote it to be a burrowing animal. (Fig. 102.) An imperfect skin, in the museum of the Zoological Society, was sent by Mr. Hearne from Hayti, who thus writes respecting it:—"The only quadruped, I believe, found on the island on the landing of Columbus was the agouta, a little larger than, and somewhat resembling, a rat, with an equally long tail and a longer snout, whose food is chiefly grain, although the



100.—Teeth of Solenodon.



101.—Feet of Solenodon.

animal is carnivorous also: its hair is red. I had one alive, intended for the Society, but it received a wound from a cat, of which it died." ('Zool. Proceeds.' 1835, p. 105.)



102.—Solenodon.

THE SHREW-MOLE

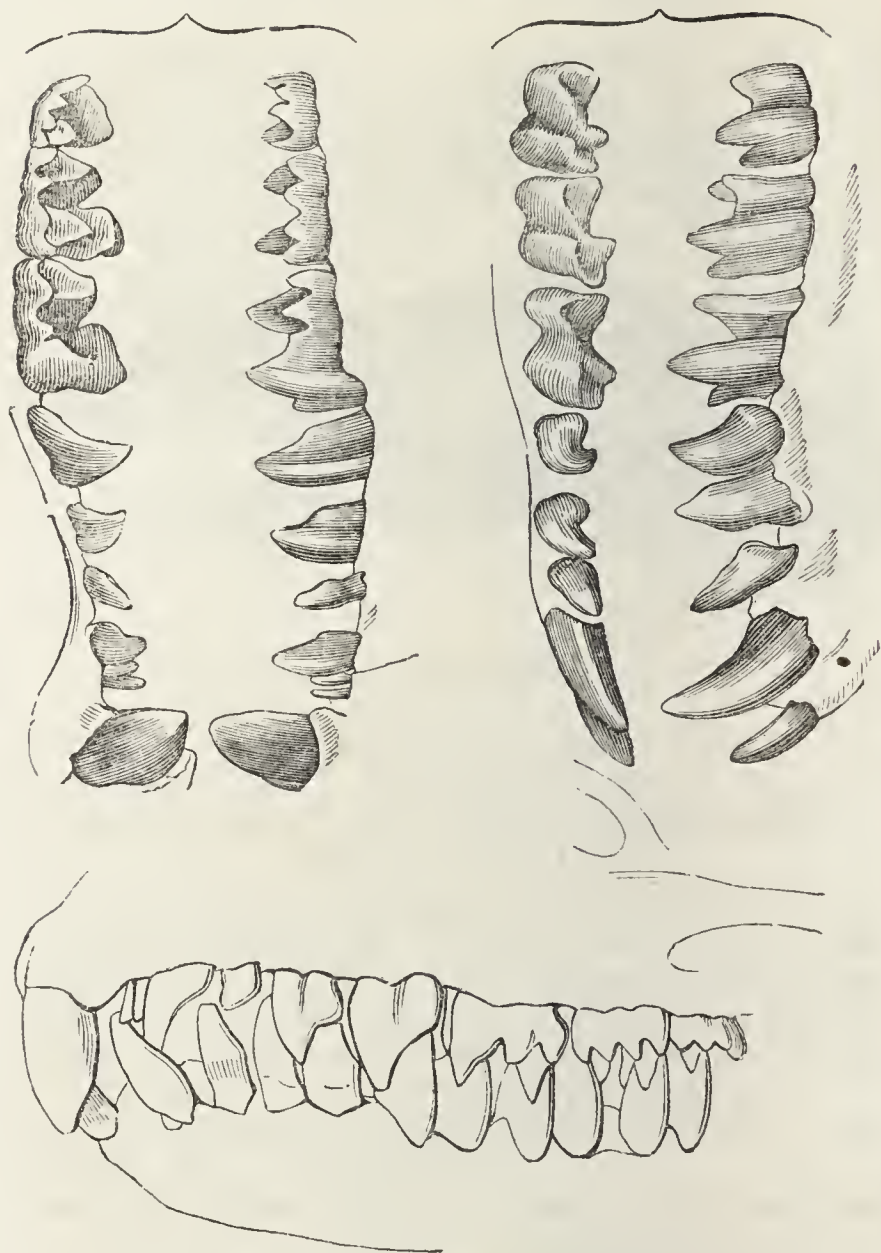
(*Scalops canadensis*, Desm.; *Sorex aquaticus*, Linn.;
Scalops aquaticus, Fischer).

The animals of this genus are peculiar to North America. Their form is mole-like; the eyes are minute in the extreme, and scarcely to be discovered; there are no external ears; the fur is velvety; the fore paws, like those of the mole, are adapted for burrowing; the tail is

short: the teeth are—incisors, $\frac{2}{9-9}$; molars, $\frac{10-10}{10-10}$, or,

according to F. Cuvier, $\frac{9-9}{9-9}$ (Fig. 103). The snout is long, tapering, flexible, and with a terminal disc.

The Canada shrew-mole measures about seven inches and a half long, exclusive of the tail, which is one inch and a half. The general colour is brownish-black. It inhabits the banks of the Columbia and the adjoining coasts of the Pacific. (Fig. 104.)



103.—Teeth of Shrew-Mole.

According to Dr. Richardson, the shrew-mole resembles the common European mole as much in habits as in form, forming galleries, throwing up mounds, and feeding on worms and grubs. Dr. Godman states that

these animals are most active in the morning, at midday, and in the evening; coming daily to the surface, when in their natural state, at noon, at which time they may be taken by driving a spade beneath them and throwing them on the ground; but they are not easily taken at any other part of the day. They burrow in a variety of soils, but in wet seasons retire to the high grounds. An individual kept in confinement by Mr. T. Peale fed largely on fresh meat, cooked or raw; drank freely, was lively



104.—Shrew-Mole.

and playful, and would follow the hand of its feeder by scent; it would then burrow for a short distance in loose earth, and, after driving a circle, return for more food. It employed its flexible snout in a singular manner whilst it was eating, doubling it down, like a proboscis, upon its food, so as to direct and force it into the mouth. An allied species (*Scalops Townsendii*) is a native of California, and another (*Scalops Pennsylvanicus*, Harland) is found in Pennsylvania.

THE COMMON MOLE (*Talpa Europæa*).

Mouldwarp and Mouldiwarp; Want in Dorsetshire and Devonshire; Wand, Old Danish; Vond, Norwegian; Maulwerf, German; Mol, Dutch; Muldvarp, modern Danish; Mulvard and Surk, Swedish; La Taupe, French; Talpa, Latin and modern Italian; Topo, Spanish; Toupeiro, Portuguese; Gwadd and Twrch daear, ancient British.

We need not say that the mole is a miner, living an almost exclusively subterranean life, ever pursuing its prey through the soil, and working out long galleries in the chase. In accordance with its destined habits is the whole of its structural development. The body is cylindrical and compact; the snout prolonged and pointed; the limbs very short; the anterior pair present a thick, contracted arm, terminating in broad solid paws, with five fingers scarcely divided, and armed with strong flat nails. The tournure of these scrapers, for such they are, gives them an obliquely outward position, and facilitates their use as scooping instruments, by which the soil is not only dug up, but thrown backwards at each stroke, and that with great energy. The hinder limbs are small, and the feet feeble in comparison with the anterior scrapers; while the body tapers to them from the chest and shoulders, so that the hinder quarters offer no impediment to the animal's progress through its narrow galleries. The fur, moreover, is such as best befits a subterranean dweller—it is extremely close, fine, short, and smooth, and resembles the nap of black velvet. Some instances have been known of their being found of a white or rather cream colour. There is no external conch to the organs of hearing, the sense of which is acute in the extreme; a simple auditory opening, capable of being closed or dilated at pleasure, leads to the internal apparatus, which is effectually defended from the intrusion of particles of earth or sand. At a cursory glance the mole appears to be destitute of eyes; they are, however, not wanting, though very small, and buried in the fur. A limited power of vision is sufficient for

this dweller in the dark; the mole, however, can see better than might be imagined. By a peculiar muscular contrivance it is capable of bringing forward, or of drawing in, the eye—and this, when withdrawn, is enveloped in and defended by the close fur; so that, as in the case with the ear, no particles of earth can injure it. We have said that the sense of hearing is exquisite; and to it the mole trusts for warning on the approach of danger:—

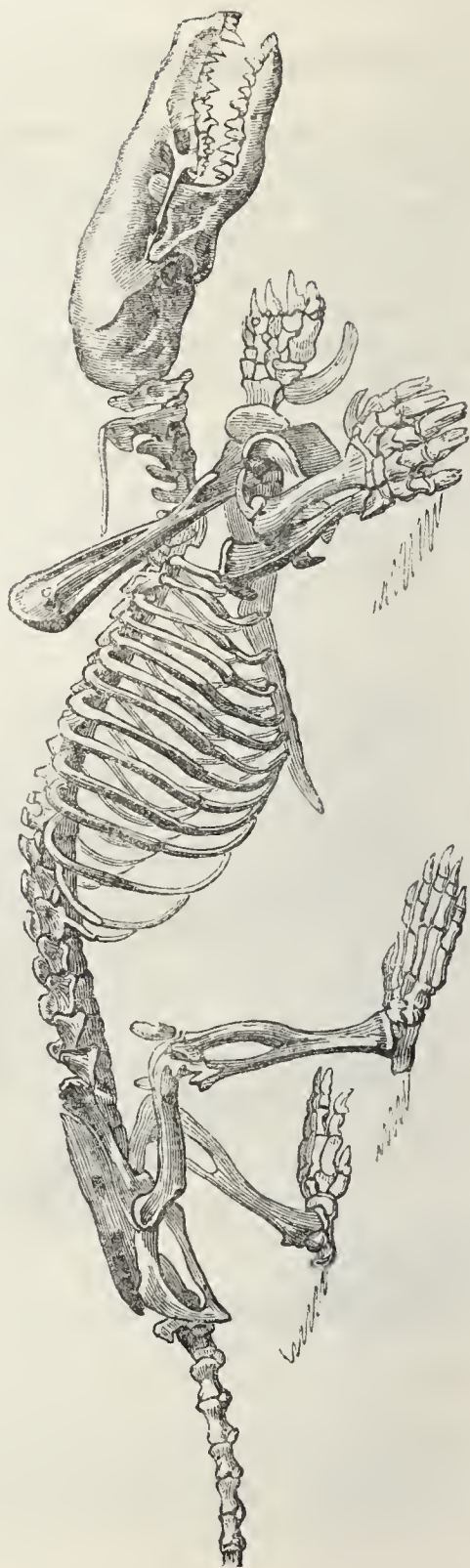
“Pray you, tread softly, that the blind mole may not
Hear a foot fall.”—SHAKSPEARE.

But the sense of smell is equally delicate; and by this it is guided in its search for food. It bores its long sharp



105.—Mole.

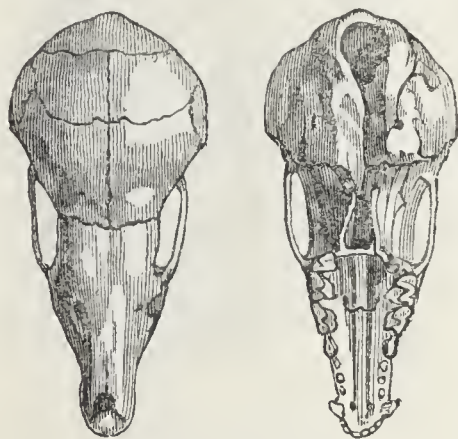
nose in the earth as it traverses its galleries, and immediately detects worms and the larvæ of insects, which constitute its chief food. Nor is the feeling of this part



106.—Skeleton of Mole.

at a low ratio; it is, on the contrary, very acute and susceptible, and aids the sense of smell in the procuring of food. The pointed snout is, indeed, a finger-like organ of prehension, as well as a boring instrument. The general skin of the body is strong and tough, and not easily torn or lacerated. (Fig. 105.)

The osseous and muscular development of the mole exhibits a perfect correspondence with its external characters and the perfection of its senses. The great development of the skeleton (Fig. 106) is anteriorly, namely, in the bones of the shoulders, arms, and chest.



107.—Skull of Mole.

The skull (Fig. 107) is depressed above, elongated, and pointed; and the snout, continued beyond the maxillary and nasal bones, is supported by a little additional bone, produced by the ossification of the cartilage. Its boring faculties are rendered still more effective by the ossified condition of the ligament of the neck, which passes from the back of the skull, down the cervical vertebræ, and which in other animals is elastic. The teeth are small, exhibiting a decidedly insectivorous character, the molars being crowned with sharp-pointed tubercles or eminences. (Fig. 108.)

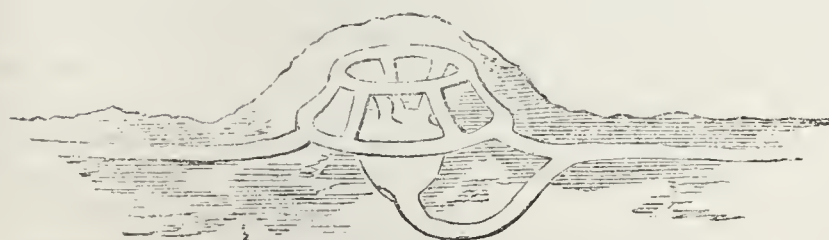
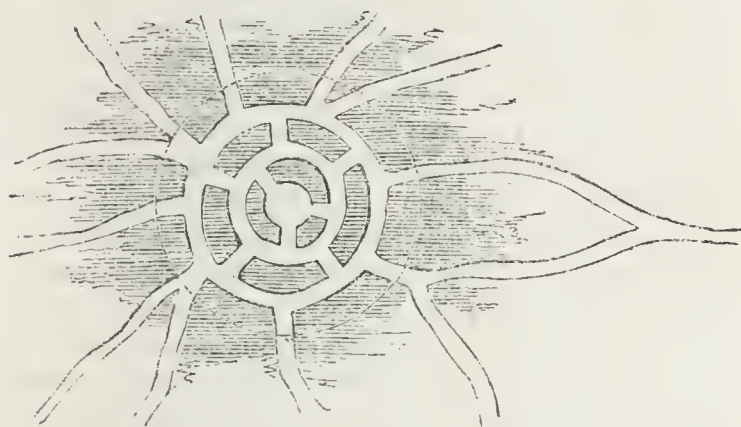
It would appear that the subterranean labours of the mole are exerted in the accomplishment of very different objects. Each mole may be said to have its own district



108.—Teeth of Mole.

or manor, its hunting-ground, and its lodges ; and this ground is traversed by high-road tunnels, through which it travels from one part to another, all branching off from a central fortress—its ordinary residence, which is, however, not only distinct, but often remote from the chamber in which the nest is made and the young reared. We will begin by describing the fortress or ordinary domicile. (Fig. 109.) The fortress is constructed under a hillock of considerable size (not one of those ordinarily thrown up every night, indicating its hunting excursions), and raised in some secure place, where a high bank, the roots of a tree, or the base of a wall, afford protection. The earth forming this mound is well compacted together, and made solid by the labours of the architect ; and within this firm-set mound is a complex arrangement

of galleries and passages of communication. First, a circular gallery occupies the upper portion of the mound, and this communicates by means of five descending passages with another gallery at the base of the mound, enclosing a larger area. These passages are nearly at equal distances. Within the area of this lower gallery is a chamber, not immediately communicating with it, but with the upper gallery, by three abruptly descending tunnels. This chamber is the dormitory of the mole.



109.—Habitation and Hunting-ground of Mole.

From the basal gallery opens a high-road tunnel, which is carried out in a direct line to the extent of the manor over which the individual presides, and from the bottom of the central chamber a passage descends, and then sweeping upwards joins this main road at a little distance from the hillock; so that the mole can enter the high-

road either from its dormitory or from the basal gallery. Besides the high-road, eight or nine other tunnels are carried out from the basal gallery; they are of greater or less extent, and wind round more or less irregularly, opening into the high-road at various distances from the hillock: these irregular tunnels the mole is continually extending in quest of prey; throwing up the soil above the turf, through holes which it makes for the purpose, and which form the ordinary mole-hills which we often see crowded thickly together. The high or main road exceeds in diameter the body of the mole, and is solid and well-trodden, with smooth sides; its depth varies, according to the quality of the soil, instinct directing the little excavator in his work. Ordinarily it is five or six inches below the surface, but when carried under a streamlet or pathway it is often a foot and a half beneath. It sometimes happens that the mole will drive two or more additional high-roads in order to the extension of its operations; and one high-road occasionally serves several moles, which, however, never trespass on each other's preserves. They often meet in these roads, which will not admit of two passing at the same time; one therefore must retreat, but when two males thus come into collision they frequently attack each other, the weaker falling a victim in the combat. The alleys opening from the sides of the high-road are generally inclined downwards with a gradual slope, and then at the termination of these the mole excavates branch alleys, upheaving mole-hills, as it works onwards in pursuit of prey. This, however, is not invariably the case, but rather where prey is abundant in rich soils: where the soil is barren, the mole is constantly driving fresh alleys; these in winter are carried deep down to where the worms have pierced their way beyond the line to which the frost penetrates; for, be it observed, the mole does not hibernate, but is as active during winter as in spring or summer, though the results of his operations are less manifest. In soft rich soils, where the worms are among the roots of the turf, the mole, as may be often noticed, drives very superficial runs in the pursuit of them; these

runs are to be seen where a thin layer of richly manured soil overlays a stratum of gravel; in fact, the depth of these alleys is always determined by the quality of the soil and consequent situation of the worms. With respect to the nest of the female, it is generally constructed at a distance from the fortress, where, at some convenient part, three or four passages intersect each other; this point of convergence is enlarged and rendered commodious, and fitted to receive a bed made of dry herbage, fibrous roots, &c. The chamber is generally beneath a large hillock, but not always; and the surrounding soil is usually such as to afford abundant food to the female with little trouble on her part. The mole breeds in the spring, mostly in April, and brings forth four or five young at a birth. These are supposed to remain under the mother's care till about half-grown, when they commence an independent existence.

Such is the constitution of the mole, that a short fast proves fatal. It would appear that all its animal appetites are in excess; its hunger is voracity amounting to rage, under the influence of which it fastens on its prey with intense eagerness. Earthworms are its favourite food, and these it skins with great address, squeezing out the earthy contents of the body before swallowing it. It is not, however, exclusively upon earthworms and the larvæ of insects that the mole feeds; during the months of June and July it is in the habit of leaving its runs under the turf, and of wandering during the night (and occasionally even during the day) on the surface, in quest of prey, such as birds, mice, frogs, lizards, snails, &c.; but it refuses to touch the toad, in consequence no doubt of the acrid exudation from that reptile's skin. During these nocturnal excursions it often falls a prey to the owl; and we have seen it in the day-time caught and killed by dogs.

The voracity of the mole and its perpetually recurring repasts upon animal food render water not only a welcome refreshment, but necessary to its existence. A run, sometimes used by many individuals, always leads to a ditch, stream, or pond, if such be within a moderate

distance. If these natural supplies be not at hand, the mole sinks little wells, in the shape of perpendicular shafts, which become filled with the rain, and retain the water; and they have sometimes been found brimfull. Scarcity of water, or a drought, as well as a scarcity of worms, often obliges the mole to shift its quarters, and locate upon other grounds. In its migration it will cross brooks or rivers, swimming admirably; and when spring or autumn floods inundate the fields, it easily saves itself by these means. It is moreover affirmed that in this peril the male and female brave the waters together, and expose themselves to the utmost danger in order to save their young, in which office of parental devotion they mutually assist and protect each other.

The disposition of this animal is fierce and combative. If several moles be kept in a box of earth, and not supplied with an abundance of food, they attack each other, and the weaker falls a prey to the stronger: when the mole seizes, it holds like a bull-dog, with a tenacious gripe, and is not easily disengaged. M. Geoffroy St. Hilaire describes the manner in which the mole approaches and seizes a bird: it exerts several stratagems to get within reach of its victim, employing the utmost address and caution; but when this is accomplished, it suddenly changes its plan, and makes an instantaneous and impetuous attack, fastens on the hapless bird, tears open the abdomen, thrusts its snout among the viscera, and revels in its sanguinary repast. After satiating its ravenous appetite, it sinks into a profound repose: in the winter it slumbers in its fortress; but in the summer, beneath some ordinary mole-hill in one of its alleys. This sleep endures for about four hours, or perhaps longer in the middle of the day, when it awakes with a renovated appetite. Its busiest time is in the evening, during the night, and early in the morning. It might be supposed from the figure of the mole that its motions were very slow and deliberate; it trips along, however, at a fair pace, and traverses its underground runs and galleries with great rapidity.

The mole does not exist in the extreme north of Scot-

land, in Zetland, or the Orkney Islands, nor has it been seen in any part of Ireland.

Varieties of this animal often occur: we have examined specimens of a mouse-colour, of a white, cream-white, and pale yellowish orange.

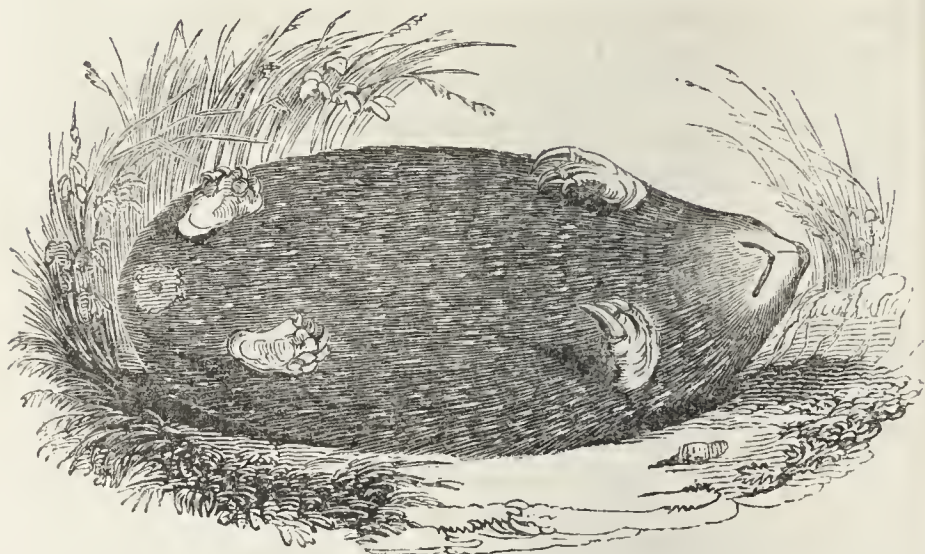
THE CAPE CHRYSOCHLORE (*Chrysochloris Capensis*).

The Mole is represented in Africa by the Chrysochlore, but the fore paws are only armed with three nails, of which the outermost is long, thick, arched, and pointed; there is no tail. (Figs. 110 and 111.) This



110.—Cape Chrysochlore.

singular animal is less than a mole, and appears to be entirely destitute of eyes. Its velvety fur has a metallic lustre, changing from dark green to bronze or copper in different lights. This species is a native of southern Africa, where it lives like the mole in burrows, and feeds on worms and insects. It is the *Taupe dorée* of the French. A second species, the Rufous Chrysochlore (*Ch. Hottentota*), has been discovered by Dr. A. Smith.



111.—Cape Chrysochlore.

THE THICK-TAILED CONDYLURE, OR STAR-NOSED MOLE
(*Condylura Macroura*).

The condylures, or star-nosed moles, are confined to North America; they closely resemble the common mole in their feet, general aspect, and habits, but the tail is longer, and the disc at the end of the snout is encircled by little moveable cartilaginous processes like the rays of a star. The eyes are extremely minute; external ears are wanting; fur deep, thick, and fine. The teeth con-



112.—Teeth of Star-nosed Mole.

sist of incisors, $\frac{2}{4}$; canines, $\frac{1-1}{1-1}$; molars $\frac{8-8}{7-7}$. (Fig. 112, teeth of *C. cristata*.)

We have no minute details respecting the manners and instincts of the Chrysochlores, of which three species are distinguished; they are burrowing animals, feeding upon worms and the larvæ of insects, &c. The thick-tailed Condylure was discovered by Mr. David Douglas on the banks of the Columbia River. The colour of the fur above is deep lustrous brown, paler on the under parts. The tail is contracted at its root, whence it gradually enlarges, and then tapers to a fine point. Length of head and body, four inches and a half; of the tail, two inches and a half. (Fig. 113.)



113.—Star-nosed Mole.

THE HEDGEHOG (*Erinaceus Europæus*).

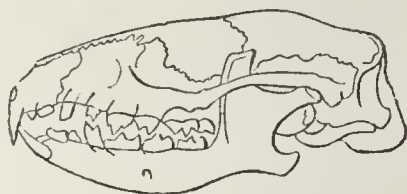
Riccio of the Italians ; Erizo of the Spanish ; Ourizo of the Portuguese ; Hérisson of the French ; Igel of the Germans ; Eegelvarken of the Dutch ; Pin-suin of the Danes ; Draenog and Draen y eoed of the ancient British ; Urehin, Provincial English ; Ἐχῖνος of the Greeks. It is superfluous to enter into an elaborate description of this spine-covered animal ; all are well acquainted with its external characters, and all know that it has the power of rolling itself up into a ball, presenting an array of serriced spines formidable to its antagonist. A peculiar muscular expansion beneath the skin enables the hedgehog thus completely to enshroud itself in its panoply, as in a hood, the margin of which is elosed by means of a circular muscle, the head and limbs being retracted within. While the animal is thus enveloped in its armed skin, the spines are stiffly set by the action of the muscular expansion, and radiate from the ball ; and such is the strength and elasticity of this covering, that a hedgehog may roll down a steep place or precipitous bank without the slightest injury. Mr. Bell assures us that he has repeatedly seen a domesticated hedgehog in his possession run towards the precipitous wall of an area, and, without hesitation or a moment's pause for preparation, throw itself off, contracting at the same instant into a ball, in which condition it reached the ground from a height of twelve or fourteen feet, when after a few moments it would unfold itself and run off unhurt. The hedgehog is nocturnal in its habits : it frequents woods, copses, old gardens, orchards, and thick hedge-rows, where it remains rolled up in its retreat during the day, coming forth on the approach of twilight, and continuing on the alert till morning. Its motions are quick and irregular, and its pace a sort of heavy paddling, the body being close to the ground, and the feet plantigrade. Its food consists of insects, slugs, frogs, toads, mice, and even snakes ; to which it adds eggs, young nestlings, and various kinds of vegetables, as the roots of grass and plantain, and ripe orchard-fruits

which fall from the trees. White notices the manner in which it bores with its snout, to get at the root of the plantain, which it eats, leaving the tuft of leaves untouched. In the first volume of the 'Zoological Journal' is the narrative, from the pen of Mr. Broderip, of an experiment made by Professor Buckland, relative to the destruction of snakes by the hedgehog, from which it would appear that the cunning quadruped makes a sudden attack on the reptile, and, giving it a hard bite, instantly rolls itself up for safety, then cautiously unfolds, and inflicts another wound, repeating its attacks till the snake is "scotched," its back-bone being broken in several places; it next passes the body of the snake gradually through its jaws, cracking the bones at short intervals, which done, it proceeds to eat its victim as one would eat a radish, beginning with the tip of the tail, and slowly proceeding upwards. We have frequently seen hedgehogs eat frogs, rapidly crunching their bones with an audible noise. The hedgehog may be easily domesticated, and becomes familiar, feeding on soaked bread, vegetables, and meat; it is useful in kitchens, which it effectually clears of crickets, cockroaches, beetles, &c., and, as it keeps quiet in its nest or retreat all day, produces itself no inconvenience. Superstitious ignorance, as in the case of the poor little shrew, has led to the cruel persecution of the hedgehog, because, forsooth, it was (and in some places still is) believed to drain dry the udders of the cows during the night, to the surprise of the milkmaid and the indignation of the farmer. To the Slow-worm and the Fern-owl (*Caprimulgus*) the same mischievous habits have also been attributed, the physical impossibility of their committing such a theft being overlooked or not appreciated. With respect to the hedgehog, this accusation, as Mr. Bell observes, is about as well founded as that by Pliny, and exaggerated by Sperling, who asserts that it ascends trees, knocks off the apples and pears, (*Ælian* says figs), and, throwing itself down upon them so that they may stick to its spines, trots off with the prize.

The hedgehog hybernates, passing the winter in a

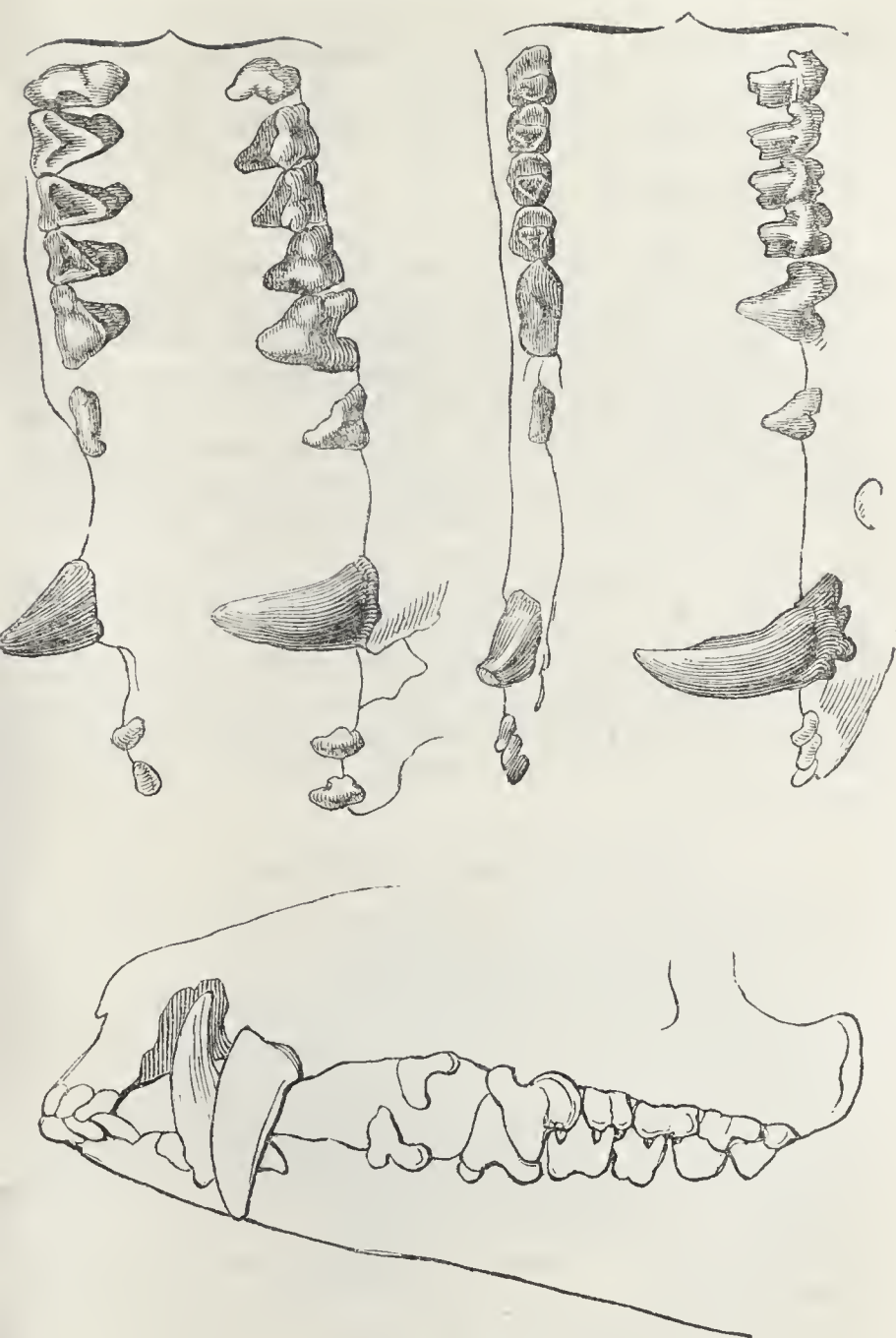
state of complete torpidity. It makes its retreat in banks under the hollow roots of trees, in holes or other sheltered and convenient places, constructing a sort of nest or bed of grasses, dried leaves, and moss; with these it covers itself deeply and closely, and when discovered hibernating resembles a ball or roundish mass of herbage, which it seems to have attached to its spines by repeatedly rolling itself round amidst the heap it had stored up.

The female breeds early in the summer, forming an artful nest, roofed so as to throw off the rain; within, it is well lined with leaves and moss. The young, from two to four in number, are blind at their birth, about two inches long, perfectly white, and naked, though the rudiments of the prickles are perceptible. These soon develop themselves, and harden even before the eyes are opened, but it is not till a later period that the young are able to draw down the skin over the muzzle, and fold themselves into a complete ball. The mother is devoted to her offspring, and unremitting in her duties. Formerly the flesh of the hedgehog was eaten in our island, and is so still on some parts of the Continent. An intimate friend of the writer had one dressed and served up for dinner, and assured us that it was excellent; we must however, remember the old adage "*De gustibus,*" &c. : few, we think, would willingly partake of such "small deer." The Romans made use of the spiny skin of the hedgehog in hackling hemp for the weaving of cloth.



114.—Skull of Hedgehog.

The hedgehog is found in most parts of Europe; its length, when full grown, is about nine inches and a half. Fig. 114 represents the skull. The dentition is as fol-



115. —Teeth of Tenrec.

lows:—Incisors, $\frac{6}{6}$, the two middle the longest; false
 molars, $\frac{3-3}{3-3}$; molars with acute tubercles, $\frac{3-3}{3-3}$; small
 tuberculous molars, $\frac{1-1}{1-1}$.

Closely allied to the genus *Erinaceus* is the genus *Centetes*, Ill. (*Centenes*, Desm.; *Setiger*, Geoff), which comprehends certain hedgehog-like animals, confined, as far as we know, to the Mauritius and Madagascar. They are covered with spines, but these spines are feebler than those of the hedgehog, nor do the animals enjoy so completely the power of rolling themselves up into a ball. They differ moreover in their dentition, the incisors

being $\frac{6}{6}$ or $\frac{4}{4}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{6-6}{6-6}$ (Fig. 115).

The muzzle is long and pointed; the tail wanting. These animals hybernate during the dry season, when their natural food, insects and worms, fails, and revive on the return of the rainy season. In their habits they are nocturnal.

THE TENREC, OR TANREC

(*Centetes ecaudatus*, Cuv.; *Erinaceus ecaudatus*, Linn.).

This species exceeds our hedgehog in size, and is covered above with long flexible spines, except on the top of the head; the under parts are clad with yellowish bristly hairs, a few black ones being intermixed.

The Tenrec is a native of Madagascar, but has been naturalized in the Mauritius. Of its habits we have but imperfect details. In June 14, 1831, a letter respecting these animals, addressed to the Zoological Society, and dated Port Louis, December 15, 1830, was read at the scientific meeting. It referred to previous unsuccessful attempts on the part of the Society's valuable correspondent to transport from the Mauritius to England living Gouramies and Tenrecs, and promised a repetition

of the experiment. Mr. Telfair states that he has now a pair of living tenrecs, fully grown, ready to send to England when he can place them under proper care. "They live on boiled rice, but will probably not exist long upon that alone, as their natural food is chiefly composed of worms, insects, lizards, and the eggs of snails, of which it would be difficult to carry a sufficient supply in a living state on board ship. Fresh supplies might, however, be obtained at Madagascar or the Cape of Good Hope, at St. Helena, Ascension, and the Cape de Verd Islands; and the animals might thus arrive in good health in England, where they would probably survive for some time, burrowing under a dungheap, or living in straw in a hothouse or greenhouse. An opportunity would thus be furnished of observing their habits. In the Mauritius they sleep through the greater part of the winter, from April to November, and are only to be found when summer heat is felt, which being generally ushered in by an electric state of the atmosphere, the negroes (with whom they are a favourite food) say they are awakened by the peals of thunder which precede



116 —Tenrec.

the summer storms or “*pluies d’orage*.” (Fig. 116.) Even in summer they are not often seen beyond the holes in which they burrow, except at night. Their favourite haunts are among the old roots of clumps of bamboos. They have a very overpowering smell of musk at all times, which is increased to an extraordinary degree when they are disturbed or frightened; yet their flesh is considered so savoury by the negroes, that they are unwilling to sell those which they catch, and would not exchange it for any other food, except perhaps for the “*ourite*,” which is the catfish hung up in the sun until it acquires a most fetid smell, tainting the atmosphere to a great distance; in this state it is a chief ingredient in their favourite ragout.



117.—Striped Tenrec.

THE STRIPED TENREC (*Centetes semispinosus*).

This species is of small size: the head is very conical; the muzzle elongated and pointed; the body is clothed with a mixture of spines and bristles, and is banded longitudinally yellow and black. Native country, Madagascar. (Fig. 117.)

THE SPINY TENREC, OR TENDRAC

(*Centetes spinosus*; *Ericulus nigrescens*? of Isidore Geoffroy).

Incisors, $\frac{4}{4}$; molars, $\frac{7-7}{7-7}$.

The tendrac of Buffon is more like a hedgehog in appearance than are the two previous species. It is covered above with close, short, stiff spines, and with bristle-like hairs on the under parts. The spines are of a deep mahogany colour, whitish at the root and point. Under parts, yellowish white. Native country, Madagascar, where it is said to make a burrow in the neighbourhood of fresh or salt water; its habits resemble those of the rest of its race, and it is acceptable to the negroes as food. (Fig. 118.)



118.—Spiny Tenrec.

An insectivorous animal allied to the tendrac, and called Sokinah at Madagascar, will be found described and figured under the name of *Echinops Telfairi*, Martin, in the 'Trans. Zool. Soc.,' vol. ii. p. 249, and characterized in the 'Zool. Proceeds.,' 1838, p. 17. Of its habits and manners no accounts have been obtained;

but from the rigidity of the spines, and the development of the muscular subcutaneous expansion (*Panniculus carnosus*), it appears probable that this animal has, like the hedgehog, the power of rolling itself up into a ball, which is not the case with the tenrec.



119.—Gymnure.

THE GYMNURE (*Gymnura Rafflesii*).

Of the genus *Gymnura* (Horsfield and Vigors) one species only is at present recognised. It is a native of Sumatra, and its introduction to science is due to the late Sir. T. Stamford Raffles, who first described it under the title of *Viverra Gymnura*. Cuvier observes that it appears to approach *Cladobates* (*Tupaia*) in its teeth, and the shrews in its muzzle and scaly tail. The toes are five in number on each foot; the eyes are small; the whiskers long; the fur consists of a short dense woolly undercoat, and long coarse thinly-set hairs. The body, legs, first half of the tail, and a stripe above the eyes, are black; the head, neck, and end of the tail are white; the muzzle is elongated. The dentition as follows:—

Incisors, $\frac{6}{6}$; canines, $\frac{1-1}{1-1}$, molars, $\frac{6-6}{6-6}$. Of its habits

nothing definite is known. It exhales a strong musky smell. Specimens are preserved in the Museum of the Zoological Society. (Fig. 119.)

THE BANXRING (*Tupaia Javanica*).

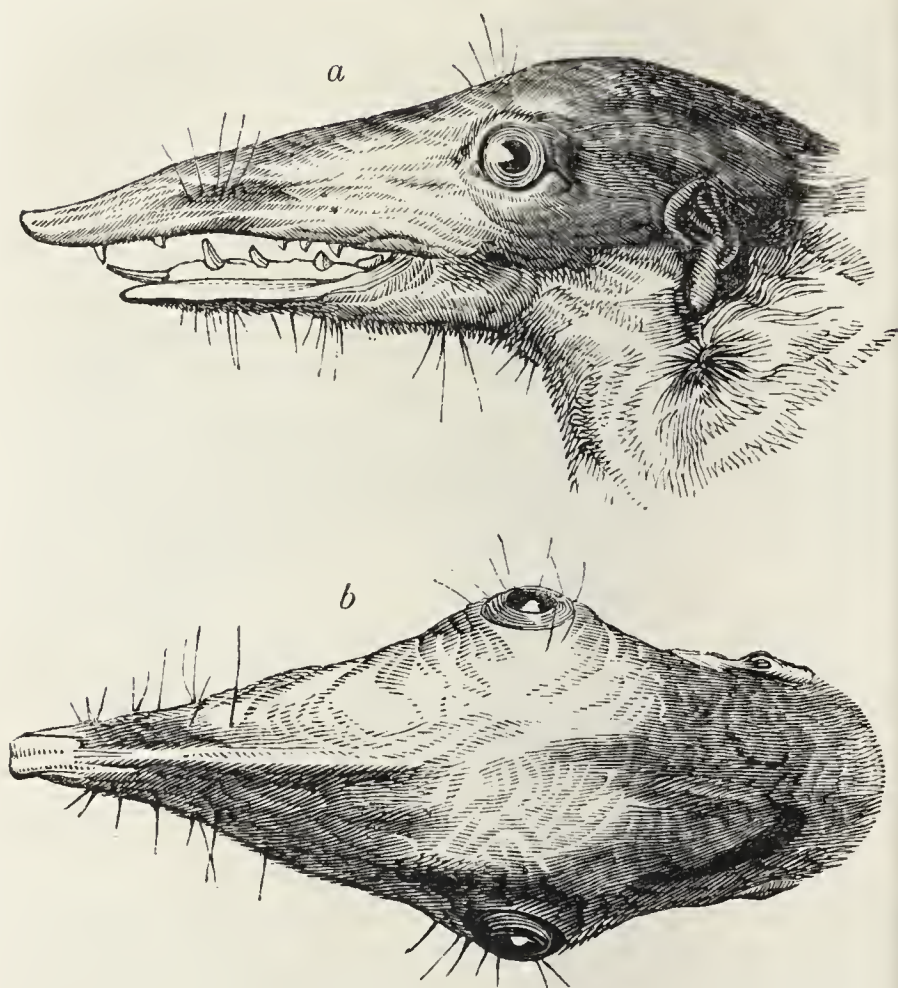
The genus *Tupaia*, Raffles (*Cladobates*, F. Cuvier; *Sorexglis*, Diard; *Glissorex*, Desmarest; *Hyogale*, Temminck), contains about three species, natives of Sumatra and Java, where they inhabit the forests. In their dentition there is some resemblance to that of the hedgehog.

The formula stands as follows:—Incisors, $\frac{2}{6}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{7-7}{6-6}$. Fig. 120 represents the teeth: *a*,



120.—Teeth of Banxring.

those of the upper jaw; *b*, those of the lower. The head is oblong and depressed; the snout long and attenuated; the nostrils lateral; the eyes very large and rather prominent; the body long, slender, and covered with close fur and soft hairs; the tail is longer than the body, and compressed; the feet plantigrade and pentadactyle; the toes compressed and furnished with hooked claws; the thumb is distinct, and moveable in a direction

121.—Head of *Tupaia Tana*.

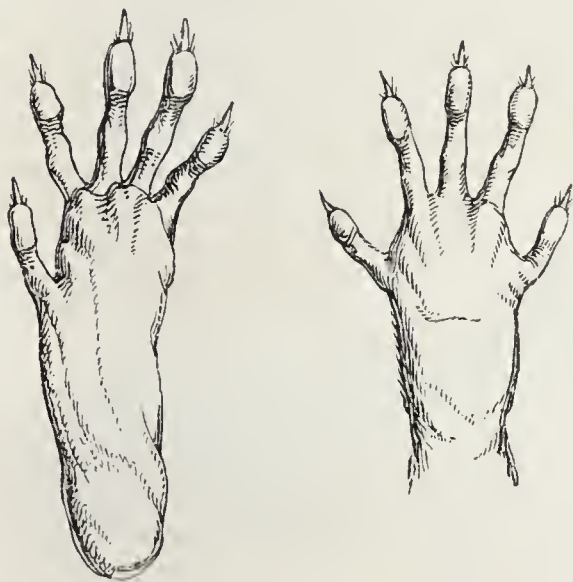
opposite to the others. Fig. 121 represents the head of the *Tupaia Tana* of Sumatra: *a*, in profile; and *b*, as seen from above. Fig. 122 represents the head of the banxring (*Tupaia Javanica*): and fig. 123—*a*, the fore-foot; *b*, the hind foot; in both the thumb is seen distinct, especially in the hind foot.

Dr. Horsfield ('Zoological Researches in Java') states that in the Malayan language the name of Tupai is a general term for various small animals which have the external form and agility of the squirrel; while each dif-

ferent species, agreeably to the observations of the natives of the islands of the Eastern Archipelago, where these animals are found, is distinguished by a particular epithet. Thus two small animals which, according to Dr. Horsfield's classification, belong to the genus above de-



122.—Head of Banxring.



123.—Feet of Banxring.

scribed, are, he says, denominated *Tupai Press* and *Tupai Tana*; while several other animals belonging to the genus *Sciurus* are denominated *Tupai Jinjang*, *Tupai Tankrawa*, &c. The same author states that three

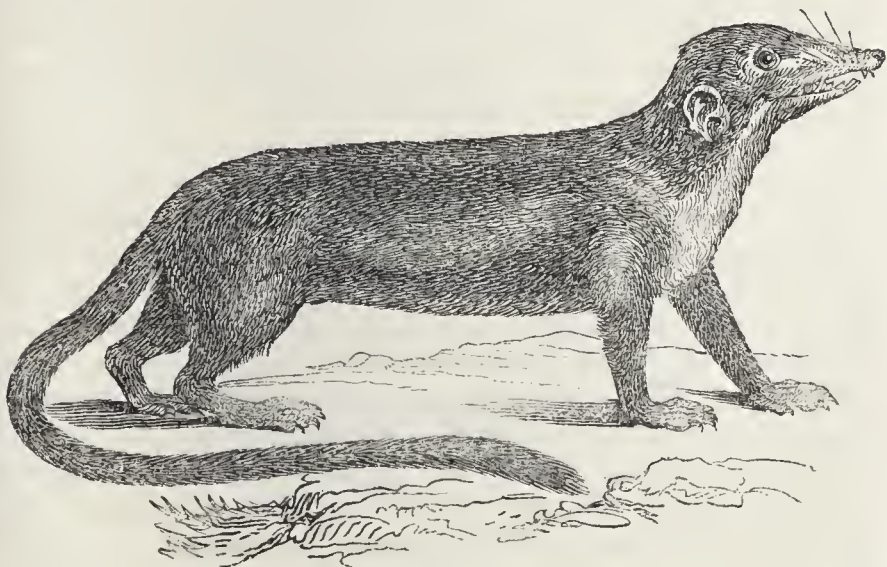
species of *Tupaia* had been discovered when he wrote, two of which are natives of Sumatra, Penang, and Singapura, while the third has been found exclusively in Java, where it is distinguished by the name of Bangsring or Sinsring.

The tupaias, instead of being strictly terrestrial, lead, to a certain extent, the life of squirrels, having all their sprightliness and activity, and much of the general appearance of those animals. They are, in fact, semi-arboreal insectivora, and, were it not for their long head and pointed snout, could scarcely be distinguished, at a distance, from some of the Sciuri. Their fine soft fur is of a dark red, and on the tail the hair, which is long and bushy, is distichous, or arranged laterally, especially if viewed on the under surface. Sir T. Stamford Raffles states that they are decidedly diurnal, their large bright eyes being suited to daylight, and that they live principally on fruits, and especially that of the Kayo gadis. The banxring or bangsring of Java is lively and active. Dr. Horsfield, who met with it during his researches in Java, states that, in traversing the province of Blambangan, in 1806, he discovered it in the extensive forests which almost entirely cover the eastern extremity of the island; and he thinks that its range, though it may not be confined exclusively to that province, is extremely limited. From the scanty information afforded by the natives, it would seem that the bangsring lives on trees, and feeds "on fruits and nuts;" but Dr. Horsfield observes that this account must be received with due limitation, and he refers to the system of dentition as indicating that the bangsring is more adapted to animal than vegetable food. Length from extremity of nose to the root of the tail, six inches five lines; of tail, six inches five lines. (Fig. 124.)

The fur of the bangsring is close, silky, and delicate, with a few longer, more rigid, and darker-coloured hairs dispersed throughout it. The upper parts are brown, slightly diversified with gray of different shades; the lower parts dirty white, with a slight tint of grayish: the tail agrees with the upper parts; and the scapular

line, which is nearly an inch long, agrees with the neck.

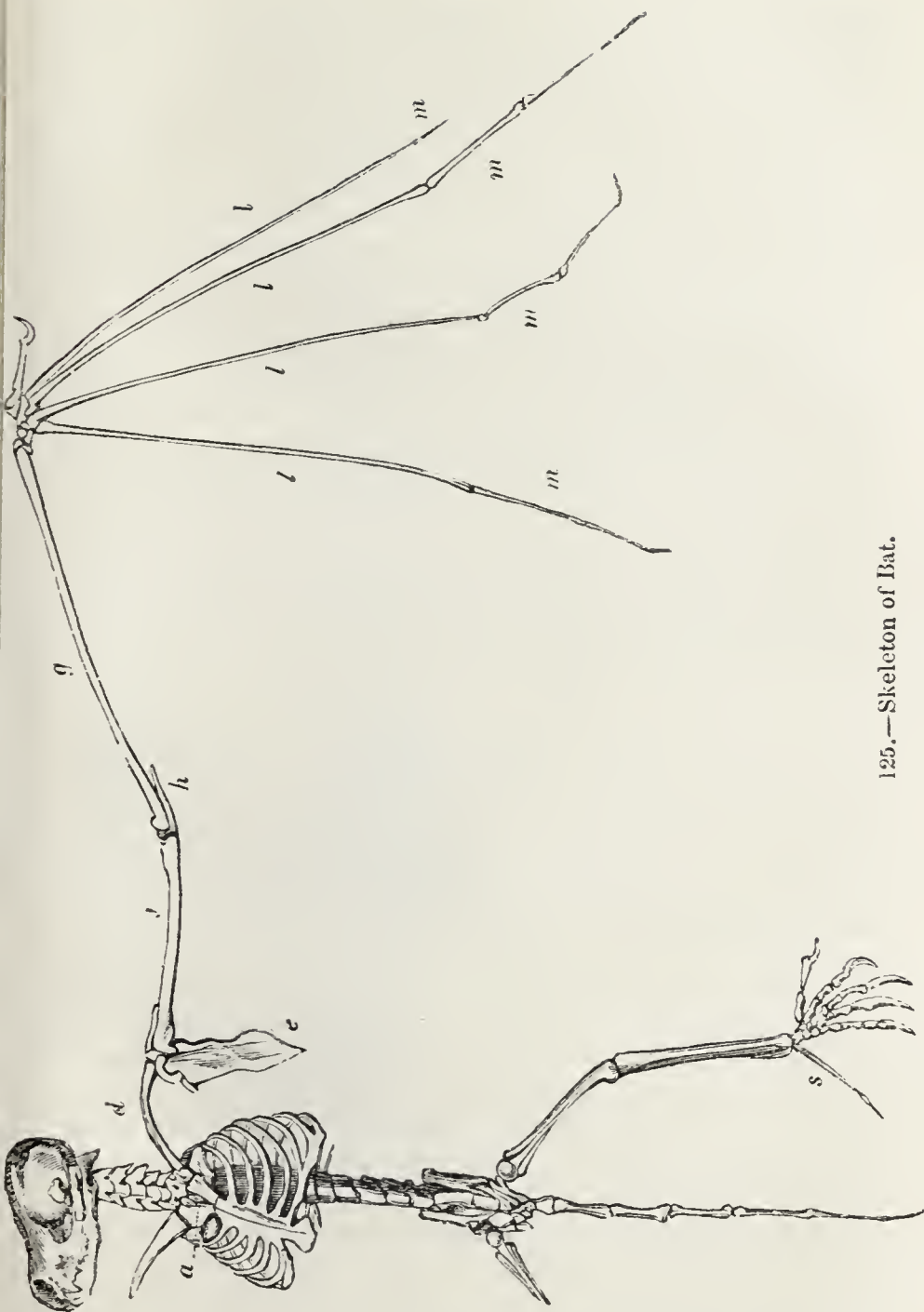
The ferruginous *Tupaia* is a native of Sumatra, and does not appear to differ essentially in its habits from the Java species. Sir Stamford Raffles states that a tame *Tupaia ferruginea* was suffered to go about at perfect liberty, ranged in freedom over the whole house, and never failed to present himself on the breakfast and dinner table, where he partook of fruit and milk. Dr. Horsfield also quotes an extract from the 'Proceedings of the Asiatic Society,' where it is stated that a living *Tupaia ferruginea* was brought to Bengal by a medical gentleman; it ran about the house tame, but would not allow itself to be caught for close inspection. Though at liberty to run out of doors whenever it liked, it showed no disposition to leave its quarters, and evinced some attachment to the family; for whenever strangers entered the house it showed disquietude and made a chattering noise. It gave no trouble in feeding, for it was always on the search after insects, and its favourite food seemed to be flies, crickets, grasshoppers, and cockroaches. Specimens of the three species are preserved in the Museum of the Zoological Society.



ORDER—CHEIROPTERA, OR BATS.

WE regard the Bats (family *Cheiroptera*, Cuvier; *Vespertilionidæ*, Gray) as constituting a distinct order, as it stands in the Catalogue of Mammalia in the 'Mus. Zool. Soc.,' 1838.

The Bats, or Flitter-mice (Fledermäuse) of the Germans; Pipistrelli and Nottoli of the Italians; Chauve-souris of the French, are termed *Cheiroptera*, that is, wing-handed (*χείρ*, a hand; *πτερον*, a wing), because their anterior limbs are modified as organs of flight. Of all the mammalia, the bats alone emulate the feathered tribes in their aerial endowments. They are essentially flying insectivora: in the air they pass the active portion of their existence and revel in the exercise of their faculties. Their organs of flight, however, consist not, as in the bird, of stiff feathers disposed in order and based upon the bones of the fore arm, but of a large thin membrane stretched over and between the limbs, to which the bones act as stretchers, like the strips of whalebone in an umbrella, the tail in many species assisting also. Of this membrane the bones of the arms and hands are the principal supporters and levers of motion—we say hands, because, though not graspers, such must the anatomist consider them. All these bones, those of the carpus excepted, are slender and remarkably elongated, and here we refer to the skeleton of the bat. (Fig. 125.) The humerus, *f*, is long and slender, but much more so is the radius, *g*, the only complete bone of the fore arm, the ulna, *h*, being reduced to a mere rudiment. The carpus, *i*, consists of six bones in two rows, the first row having two, the second row four bones, on which are based the metacarpal bones of the thumb, *k*, and of the fingers, *l*. These bones of the fingers are very slender and of extraordinary length, diverging from each other as they proceed. They are, however, moveable upon the metacarpus, and are not only capable of closing together, but of being folded down in contact with the fore arm. The phalanges, or true finger-bones, *m*, carry



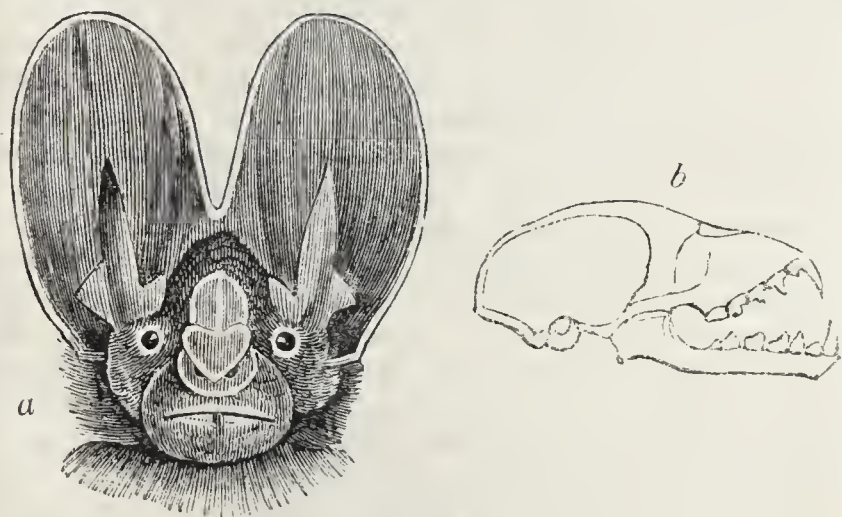
125.—Skeleton of Bat.

on the elongation of this framework, and taper to a point, like the extremity of an angling-rod, unfurnished with nails or claws. These fingers are essential not only for carrying out the wing to a due distance, but for keeping its margins stretched out, and for folding it down when requisite. In some genera the first finger consists but of one very fine bone, the second finger consists of three: occasionally the first finger is tipped with a very small hook-like nail. The thumb, *k*, is free, and usually short, consisting of a metacarpal and two digital bones, the last of which is armed with a strong hooked claw. Such then is the hand of the bat, essentially an apparatus for flight. Thus designed and constructed, rotation of the fore arm would not only be an unnecessary, but indeed an inconsistent endowment; its motion, therefore, is simply hinge-like, while that of the shoulder is to a great extent rotatory.

It will easily be conceived that a membrane so extensive as the wing of the bat will require for its effective movements an extraordinary development of the muscles which govern it. That part of the skeleton, therefore, on which these muscles are fixed is accordingly modified; the clavicles, *d*, and scapulæ, *e*, are of great magnitude and strength; the sternum, or breast-bone, though narrow, has a keel-like elevation along its anterior surface, analogous to what is seen in birds, while its upper end is developed into a manubrium, *a*, for the support of the large clavicles, which are thus thrown far laterally, the pectoral muscles being at the same time exceedingly voluminous; indeed the whole of the osseous and muscular structure of the bat is concentrated upon its organs of flight. The hinder limbs can scarcely be regarded as organs of locomotion; they principally serve, in conjunction with the tail where present, to keep the membrane duly expanded—they are therefore comparatively feeble: the toes are five in number, and armed with sharp hooked claws, by which the animal suspends itself while at rest in its retreat. When with folded wings the bat attempts to proceed along a level surface, its movements, though tolerably quick, are awkward and

shuffling; and it uses the claw of its thumb as a hook for catching hold of any irregularities in order to drag itself along: hence, on a smooth polished surface it is greatly embarrassed, but in the hollows of trees, in the crevices of masonry, and in rough chinks or fissures, it can climb and crawl about with considerable facility, as also about the wire-work of a cage, as we have often witnessed. The ground, however, is not the destined province of the bat—the air is its home; it is here that these singular creatures are all alertness, pursuing their insect prey, and uttering their short sharp cry as they wheel in circling flights, or perform their abrupt and zigzag evolutions.

In the bat the senses of smell and hearing, as might be concluded from the development and complication of their respective organs, are wonderfully acute. In several extensive genera, with a view to the refinement of these senses, we see the nose furnished with a membranous foliation or leaf of most delicate structure, and often complex in its arrangement; while the external membranous ears are large, expanded, and often united



126.—Trifoliated Megaderma.

together, having folds or an inner reduplication, and capable of being folded down. (See fig. 126, the head of *Megaderma trifolium*.) In short, both the osteological characters of the skull and the development of the external appendages, traversed by multitudes of nerves,

announce the acuteness both of smell and hearing. But these creatures have another sense, that of feeling, so exquisitely refined as to require especial notice. The wings of these creatures consist, as we have stated, of a delicate and nearly naked membrane of great amplitude; and these, as well as the membranous tissues of the ears and nose, are abundantly supplied with nerves, and have their sensibility so high as to afford something like a new sense which stands in the stead of sight. The modified impressions which the air in quiescence, or in motion, however slight, communicates—the tremulous jar of the faintest current—its temperature—the indescribable condition of such strata as are in contact with different bodies, are all apparently appreciated by the bat. If its eyes be covered up—nay, if it be even cruelly deprived of sight—it will pursue its course about a room with a thousand obstacles in its way, avoiding them all; neither dashing against the walls nor flying foul of the smallest thing, but threading its course with the utmost precision and quickness, and passing adroitly through apertures, or the interspaces of threads placed purposely across the apartment. This endowment, which almost exceeds belief, has been abundantly demonstrated by the experiments of Spallanzani and others; it is the sense of touch refined to an inconceivable degree of perfection, rendering the bat aërial in feeling as in habits.

Bats are all crepuscular or nocturnal; during the day they sleep in their recesses, hanging head downwards, suspended by the hind feet. Numbers often congregate together on one common dormitory, and, in Java and other adjacent islands one of the most extraordinary sights is that of a tree literally loaded with a crowd of huge roussettes, or flying foxes (*Pteropus*), all clustered together in pendant rows along the branches. In our latitudes the bats all hibernate, hanging in the same manner as during their ordinary sleep; but whether this law of hibernation prevails among those species which are natives of the hotter regions does not appear to be satisfactorily determined; probably it does, for the tenrec (an animal allied to our hedgehog) hibernates in Madagascar, its native country.

The bats are extremely numerous, and are distributed over every portion of the globe, excepting in the coldest latitudes; it is, however, in the warmer regions that they are the most abundant, and attain to the largest dimensions.

We have said that the bats are insectivorous; some, however, are bloodsuckers; and some, as the roussettes (*Pteropus*), eat fruit, plundering the gardens of their choicest productions. It would seem that some of the Brazilian bats also are frugivorous, devouring the fruit of the fig-tree, and that it is almost impossible to prevent the mischief, as they will creep, like mice, under the netting spread to protect the trees.

In the bats the mammæ are two, and pectoral; the dentition varies: the symphysis of the lower jaw is firmly ossified, as in man and the ape tribe; a slender stylet (s, Fig. 125) runs from the heel to support the interfemoral membrane. The bats are divided by Mr. Gray into five great sections or tribes, as follows, under two primary heads:—

I. *Istiophori*, or Leaf-nosed Bats.—Nostrils placed in a bald space, often elevated behind into a leaf; teeth acutely tubercular; index-finger not clawed.

Tribe 1. *Phyllostomina*. Nose-disc expanded into a leaf behind, simple, and pierced with the nostrils in front.

Tribe 2. *Rhinolophina*. Nose-disc expanded into a leaf behind, and with a pit or process between the nostrils in front.

II. *Anistiophori*. Simple-nosed Bats. Nostrils without a nasal leaf.

Tribe 3. *Vespertilionina*. Grinders acutely tubercular; wings broad and large; tail elongated and enclosed in the large conical interfemoral membrane; upper incisor teeth near the canines, with a central space.

Each nostril placed in front of a groove, with a spiral, convolute, outer margin lobed anteriorly.

Tribe 4. *Noctilionina*. Grinders acutely tubercular; wings long and narrow; body thin; tail thick, short, the tip appearing on the upper surface of the large interfemoral membrane.

Tribe 5. *Pteropina*. Grinders bluntly tubercular ; nose simple ; nostrils slightly produced ; end of index-finger clawed ; head conical ; ears simple ; wings long ; lower joint of thumb long, united to the wing by a membrane ; interfemoral membrane short ; tail none, or short. Fruit-eating bats of Indian islands and Polynesia.

Each of these tribes is again subdivided according to the variations of minor points of structure, the genera being arranged under each subsection ; but to pursue the subject into these niceties would be here out of place ; we, however, recommend our scientific readers to the 'Revision of the Genera of Bats,' &c., by J. E. Gray, F.R.S., published in the 'Magazine of Zoology and Botany,' No. xii.

Of the first tribe (*Phyllostomina*) our pictorial museum affords us several examples.

THE CRENULATED JAVELIN-BAT

(*Phyllostoma crenulatum*.)



127.—Crenulated Javelin-Bat.

In the genus *Phyllostoma* the canine teeth are very strong. Dental formula:—Incisors, $\frac{4}{4}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{5-5}{5-5}$; =32. There are two nasal appendages, one like a horse-shoe, the other like a leaf or spear-head, rising up behind the former; the ears are large, with a dentilated inner slip (oreillon, or tragus); the tongue is bristled with papillæ; the tail is variable in length, sometimes wanting. The present species, of which the habits and exact locality are unknown, is a native of America. (Fig. 127.)



128.—Greater Javelin-Bat.

THE GREATER JAVELIN-BAT

(*Phyllostoma perspicillatum*).

This species is a native of South America. Mr. Darwin found it at Bahia. Of its habits we have no details. (Fig. 128.)

THE VAMPIRE-BAT (*Vampirus spectrum*).

The genus *Vampirus* differs from *Phyllostoma* in having one molar more on each side in the upper jaw. Fig. 129 shows the characters of the incisors and canines.

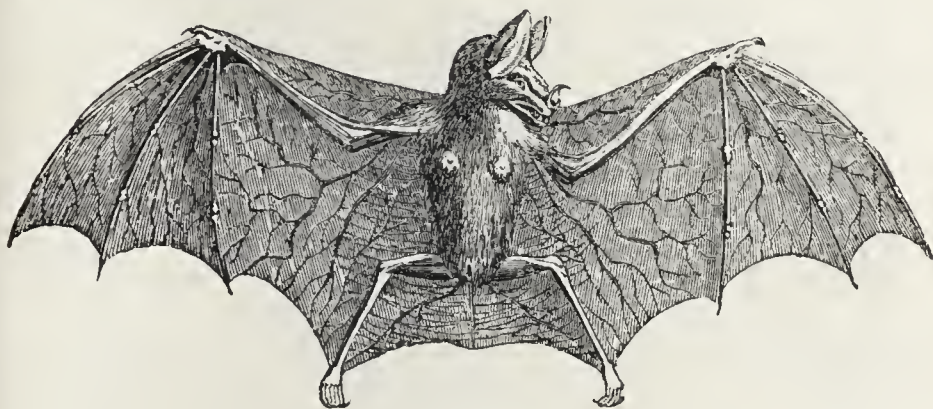
This species, the Andira-Guacu of Piso, is a native of South America; its total length is about six inches. (Fig. 130.) Piso thus describes its habits:—These bats “seek out every kind of animal and suck their blood; but in Maranham there is a certain kind which approaches by night the naked feet of men, and wounds



Fig. 129.

them for the sake of sucking human blood. The bite is so slight and subtle, that the wounded do not feel it before the bed, covered with blood, gives token of the wound. So great a quantity of blood flows from the envenomed bite, that it can only be stopped with difficulty, and the peril is imminent unless a cure by the prescribed remedies be effected. The inhabitants first wash these wounds with sea-water, and afterwards apply hot ashes, or even cauteries, if the blood be not stopped.” Captain Stedman, who states that he was bitten, thus describes the operation:—“Knowing, by instinct, that the person they intend to attack is in a sound slumber, they generally alight near the feet, where, while the creature continues fanning with its enormous wings, which keeps one cool, he bites a piece out of the tip of the great toe, so very small, indeed, that the head of a pin could be scarcely received into the wound, which is consequently not painful; yet through this orifice he continues to suck the blood until he is obliged to disgorge. He then begins again, and thus continues sucking and disgorging till he is scarce able to fly; and the sufferer has often

been known to sleep from time into eternity. Cattle they generally bite in the ear, but always in places where the blood flows spontaneously. Having applied tobacco ashes as the best remedy, and washed the gore from myself and my hammock, I observed several small heaps of congealed blood all round the place where I had lain upon the ground ; on examining which, the surgeon judged I had lost at least twelve or fourteen ounces during the night."



130.—Vampire-Bat.

From these and similar accounts, themselves a little overcoloured, have arisen extravagant representations and false statements, to which too much credit has been given : bloodsucking propensities, moreover, have been attributed to the bats of Java and other countries, without any authority ; and the tongue, instead of the sharp lancet-like teeth, has been regarded as the instrument by which the puncture is made. D'Azara, speaking of the bloodsucking bats of South America (and he is a faithful describer), observes that " the species with a leaf upon the nose differ from the other bats (of Paraguay) in being able to run, when on the ground, nearly as fast as a rat, and in their fondness for sucking the blood of animals. Sometimes they will bite the wattles and crests of fowls while asleep, and suck their blood. The fowls generally die of this, as gangrene is engendered in the wounds. They bite also horses, mules, asses, and horned cattle, usually on the shoulders, buttocks, or neck, as they

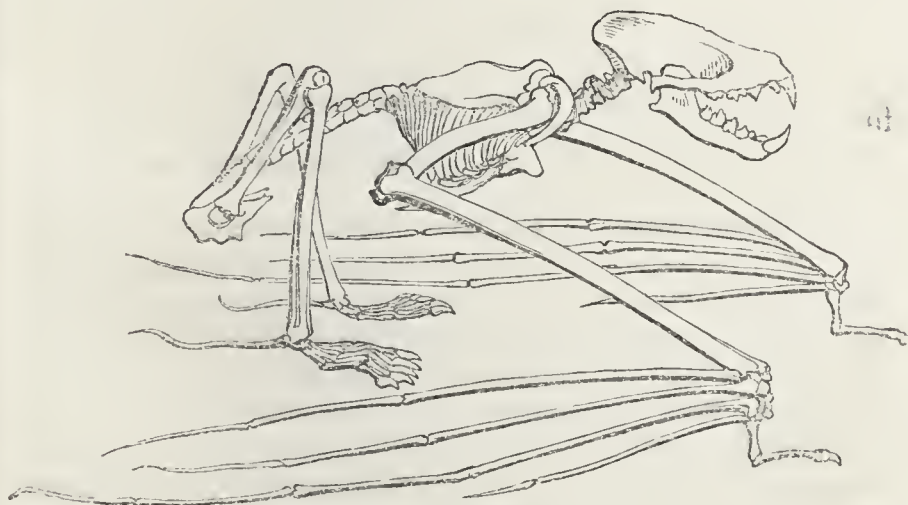
are better enabled to arrive at those parts from the facilities afforded them by the mane and tail. Nor is man himself secure from their attacks : on this point I am able to give a very faithful testimony, since I have had the ends of my toes bitten by them four times while I was sleeping in the cottages in the open country. The wounds which they inflicted, without my feeling them at the time, were circular, or rather elliptical ; their diameter was trifling, and their depth so superficial as scarcely to penetrate the cutis." The blood drawn "is merely from the capillary vessels of the skin, and is extracted thence, beyond doubt, by the action of sucking or licking." Nobody "fears these animals or gives himself any trouble about them."

To the same effect is Mr. Swainson's testimony :— "They are constantly in the habit of attacking animals during the night and sucking their blood. Our own horses and mules on many occasions, after having arrived at the end of the day's journey and being turned out to graze, would be brought in by the guides in the morning with their shoulders and haunches covered with blood ; neither is it an uncommon thing for these real vampires to enter the habitations of the natives, and fasten on the legs of some incautious sleeper who has not snugly secured his feet beneath the coverlid. Stories, indeed, are told of these incautious sufferers having bled so profusely as to have died ; but we never could ascertain the fact, nor did we ever suffer from the visits of these midnight phlebotomists."

Mr. Darwin was fortunate enough to capture a blood-sucking bat (*Desmodus D'Orbigny*, Waterhouse) in the act. "The vampire-bat," says Mr. Darwin, in that part of his highly interesting book which relates his adventures when travelling on horseback in the neighbourhood of Rio Janeiro, "is often the cause of much trouble by biting the horses on their withers. The injury is generally not so much owing to the loss of blood as to the inflammation which the pressure of the saddle afterwards produces. The whole circumstance has lately been doubted in England : I was, therefore, fortunate in being present when one was actually caught on a horse's

back. We were bivouacking late one evening, near Coquimbo, in Chile, when my servant, noticing that one of the horses was very restive, went to see what was the matter, and, fancying he could distinguish something, suddenly put his hand on the beast's withers, and secured the vampire. In the morning the spot where the bite had been inflicted was easily distinguished, from being slightly swollen and bloody. The third day afterwards we rode the horse without any ill effects."

"It is interesting," says Mr. Waterhouse, "to find that the structure of the animal is in perfect accordance with the habits above detailed by Mr. Darwin. Among other points, the total absence of true molars, and the consequent want of the power of masticating food, is the most remarkable: on the other hand, we find the canines and incisors perfectly fitted for inflicting a wound such as described, while the small size of the interfemoral membrane (giving freedom to the motions of the legs), together with the unusually large size of the thumb and claw, would enable the bat, as I should imagine, to fix itself with great security on the body of the horse. ('Zool. of Beagle,' No. 1 of Part II., p. 2.)



131.—Skeleton of Vampire.

Fig. 131 represents the skeleton of a species of vampire, as figured by De Blainville.

THE TRIFOLIATED MEGADERMA

(Megaderma trifolium).

In the genus *Megaderma* the nose-leaf is simple and erect; the wings and ears are very large; there is no tail; incisor teeth wanting. The *Megaderma trifolium* inhabits Java, where it is called Lovo by the natives. In Fig. 126, *b* represents the skull of the *Megaderma frons* of Western Africa.

Passing to the second tribe, *Rhinolophina*, we find the following examples:—



132.—Splendid Horseshoe-Bat.

THE SPLENDID HORSESHOE-BAT

(Rhinolophus nobilis, Horsf.; Hipposideros nobilis, Gray).

This fine species, a native of Java, is called Kêbbîlêk by the Javanese. The nasal apparatus consists of a broad membrane stretching transversely across the nose in form of a shelf; the sides are bounded by several parallel folds, and inferiorly it constitutes a semicircular envelope, which has a short, obtusely-rounded point in the middle. Colour above, pure brown; beneath, brown variegated with gray. Fur remarkably long and silky, and supplied with a most delicate down at the base, so as to be throughout very soft to the touch. Body four inches in length. Expansion nineteen inches and a half. (Fig. 132.)

THE THREE-TOOTHED HORSESHOE-BAT

(*Rhinolophus tridens*, Geoff.; *Hipposideros tridens*, Gray).

This is a small species, found in great numbers in the tombs of Egypt, where the objects of ancient idolatry are, indeed, given "to the bats," which find in the recesses and chambers of temples and pyramids a congenial retreat. Fig. 133 shows the head and skull.



133.—Three-toothed Horseshoe-Bat.

Of the third tribe, *Vespertilionina*, the following are specimens:—

GEOFFROY'S NYCTERIS (*Nycteris Geoffroyi*).

We have already alluded to the sensibility with which the integuments of the bats are endowed; this, however, is not the only peculiarity to be noticed, for in the genus *Nycteris* there exists a power of inflation to such a degree, that, when the faculty is exerted, the animal looks, according to Geoffroy, like a little balloon fitted with wings, a head, and feet. The subcutaneous tissue is the part inflated, and, as the skin adheres to the body at particular points only, the connexion being by means of loose cellular membranes, spaces are left which can be filled with air at the will of the *Nycteris*, through the cheek-pouches, which are perforated at the bottom so as to communicate with those spaces. When the *Nycteris* wishes to inflate its skin, it draws in its breath,

closes its nostrils, and transmits the air through the perforations of the cheek-pouches to the subcutaneous spaces, and the air is prevented from returning by the action of a sphincter, which closes those openings, and by valves of considerable size on the neck and back. Fig. 134 shows the head and skull.



134.—Geoffroy's *Nycteris*.

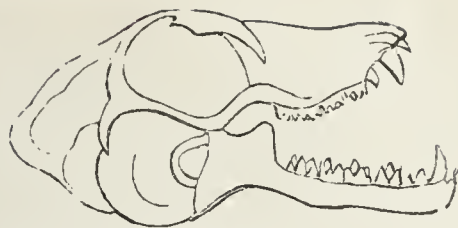
The characters of this genus may be thus summed up: a deep furrow down the forehead; nostrils covered by a cartilaginous moveable lid; interfemoral membrane very large, comprehending the tail, which terminates in a little

bifid cartilage. Incisors, $\frac{4}{6}$; molars, $\frac{4-4}{5-5}$; ears large,

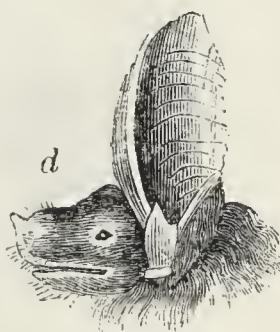
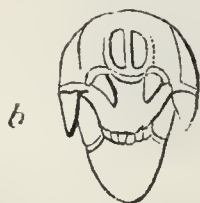
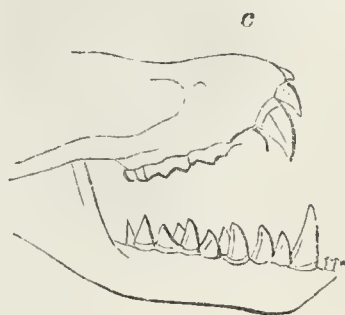
united at their base. Geoffroy's *Nycteris* is a native of the Thebaid and Senegal.

Of the British bats, the Common Bat (*Vespertilio pipistrellus*), the Great Bat (*V. noctula*), and the Long-eared Bat (*Plecotus auritus*), it is not necessary to give representations; but Fig. 135 represents the head and skull of the *Vespertilio pipistrellus*: Fig. 136 the head and skull of the Timor Long-eared Bat (*Plecotus Timoriensis*); *b*, front view of the teeth; *c*, profile of the skull; *d*, profile of the head.

Of tribe 4, *Noctilionina*, the following are examples:—



135.—Head and Skull of Common Bat.



136.—Timor long eared Bat.

THE MAURITIUS TAPHOZOUS

(*Taphozous Mauritianus*).

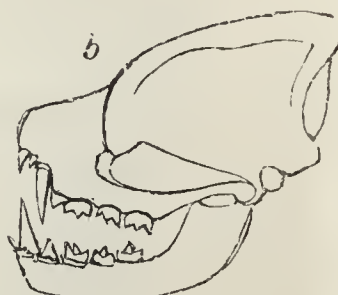
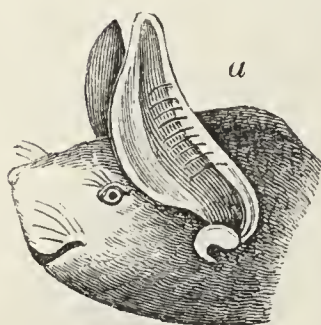
In the genus *Taphozous* there are no incisor teeth on the upper jaw. Several species are known; the one of which we represent the head is a native of the Mauritius. (Fig. 137.)

THE LEPORINE NOCTILIO (*Noctilio leporinus*).

Canines very strong; muzzle short and swollen, and divided and studded with fleshy tubercles or warts; nose simple, and losing itself in the lips; ears small and lateral; interfemoral membrane very much developed; and enveloped at its base. Dental formula:—Incisors,



137.—Mauritius Taphozous.



138.—Leporine Noctilio.

$\frac{4}{2}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{4-4}{5-5}$; = 28.

Fig. 138: *a*, profile of head; *b*, profile of skull; *c*, front view of muzzle; *d*, front view of teeth.

The *Noctilio leporinus* is of the size of a rat. Fur of a uniform reddish yellow. This is the *Vespertilio leporinus* of Gmelin; *Noctilio unicolor* of Geoffroy. Localities—Brazil, Peru, and Paraguay.

THE DUSKY MOLOSSUS (*Molossus obscurus*).

Head short, muzzle swollen; ears large; earlet external; interfemoral membrane straight, with a square termination; tail long, enveloped at its base, and most frequently free at its extremity. Dental formula:—Incisors, $\frac{2}{2}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{5-5}{5-5}$ = 28. (Fig. 139.) The



139.—Head, Skull, and Front Teeth of Dusky Molossus.

geographical distribution of this form is wide: Africa, Asia, and South America possess it; but the species which are numerous occur principally in the two last-mentioned localities.

The *Molossus obscurus* (*Molossus fumarius* of Spix; *Dysopes obscurus* of Temminck) is of the size of the Barbastelle of Europe. Fur composed of hair of two colours, blackish-brown above, and ash-brown below. Whiskers at the borders of the lips. Length about three inches three lines. Expansion nine inches. Localities, Brazil and Guiana.

The fifth tribe, *Pteropina*, contains the following :—

THE AMBOYNA PTEROPUS (*Pteropus Dussumieri*).

The Roussettes, Ternate Bats, or Flying Foxes, as the Pteropi are termed, are, most of them, of large size, with fox-like heads and a vast spread of wing : the molars

are $\frac{5-5}{6-6}$ or $\frac{4-4}{6-6}$, and bluntly tubercular ; the tongue

is short ; interfemoral membrane very little developed. Fig. 140 represents the skull of Kerauden's Roussette. The present species is a native of India and Amboyna, and is of large size ; its manners closely resemble those of the kalong. (Fig. 141.)

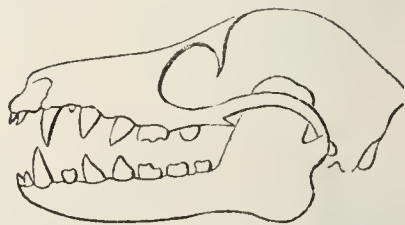


Fig. 140.

THE KALONG (*Pteropus Javanicus*).

This species, which measures five feet in the spread of the wings, is a native of Java. The upper part of the neck is smoky-red ; the rest of the fur dull black. (Fig. 142.) In the lower parts of Java it is very common, and lives in troops, which do not appear to visit the more elevated districts. Numerous individuals, says Dr. Horsfield, select a large tree for their resort, and, suspending themselves by the claws of their hind limbs to the naked branches, often in companies of several hundreds, afford to a stranger a very singular spectacle. A species of ficus, resembling the *Ficus religiosa* of India, which is often found near the villages of the natives, affords them a very favourite retreat, and the extended



141.—Amboyna Pteropus.

branches of one of these are sometimes covered with them. They pass the greater portion of the day in sleep, hanging motionless: ranged in succession, with the head downwards, the membrane contracted about the body, and often in close contact, they have little resemblance to living beings, and by a person not accustomed to their economy are readily mistaken for a part of the tree, or for a fruit of uncommon size suspended from its branches. In general these societies preserve a perfect silence during the day; but if they are disturbed, or if a contention arises among them, they emit sharp piercing shrieks, and their awkward attempts to extricate themselves when oppressed by the light of the sun exhibit a ludicrous spectacle. In consequence of the sharpness of their claws, their attachment is so strong that they cannot readily leave their hold without the assistance of the

expanded membrane ; and if suddenly killed in the natural attitude during the day, they continue suspended after death. It is necessary, therefore, to oblige them to take wing by alarming them, if it be desired to obtain them during the day. (Fig. 143.) Soon after sunset they gradually quit their hold, and pursue their nocturnal flight in quest of food. They direct their course, by an unerring instinct, to the forests, villages, and plantations, occasioning incalculable mischief, attacking and devouring indiscriminately every kind of fruit, from the abundant and useful cocoa-nut which surrounds the dwelling of the meanest peasantry, to the rare and most delicate productions which are cultivated with care by princes and chiefs of distinction. By the latter, as well as by the European colonists, various methods are employed to protect the



142.—Kalong.

orchards and gardens. Delicate fruits, such as mangoes, jambus, lansas, &c., as they approach to maturity, are ingeniously secured by means of a loose net or basket, skilfully constructed of split bamboo. Without this precaution, little valuable fruit would escape the ravages of the kalong. There are few situations in the lower parts of Java in which this night-wanderer is not constantly observed : as soon as the light of the sun has retired, one animal is seen to follow the other at a small but irregular distance, and this succession continues uninterrupted till darkness obstructs the view. The flight of the kalong is slow and steady, pursued in a straight line, and capable of long continuance. The chase of the kalong forms occasionally

an amusement of the colonists and inhabitants during the moonlight nights, which in the latitude of Java are uncommonly serene. He is watched in his descent to the fruit-trees, and a discharge of small shot readily brings him to the ground. By this means four or five individuals are frequently obtained in the course of an hour.



143.—Kalong.

PALLAS'S MOLUCCA BAT (*Harpyia Pallasii*).

The genus *Harpyia* of Illiger (not of Cuvier) differs in having the wings arising from the centre of the back, the lips thick, and the head broad and short; index-finger clawed. The *Harpyia Pallasii* (*Cephalotes Pallasii*, Geoffroy) is a native of the Moluccas. It measures two feet in the expansion of the wings. The dental formula is thus:—Incisors, $\frac{2}{0}$; canines, $\frac{1-1}{1-1}$; molars, $\frac{4-4}{5-5}$.

Of the habits of this species we have no details; but we give a representation of the head and jaw. (Fig. 144.)

It may surprise some to learn that fourteen distinct species, referable respectively to the genera *Rhinolophus*, *Barbastellus*, *Plecotus*, *Vespertilio*, and *Scotophilus*, are indigenous in our island. Of these, however, several are extremely rare and restricted to certain localities; but some, as the *Pipistrelle* (*Vespertilio Pipistrellus*, Geoff.; *Scotophilus communis*, Gray) and the Long-eared Bat (*Plecotus auritus*), are everywhere abundant. Nor is the Great Bat (*Vespertilio Noctula*, Schreb.; *Scotophilus Noctula*, Gray) of unfrequent occurrence.



144.—Pallas's Molucca Bat.

It has been suspected that some of our British bats may possibly migrate, and pass the winter, like the swallow, in some genial region where their insect prey is abundant. For this supposition there is not the slightest foundation; all our bats hybernate; but the period at which they become torpid in their retreats, and revive to visit again "the glympsés of the moon," differs in the different species. The pipistrelle, or common British bat, is the soonest roused from its lethargic trance. It usually appears in March, and does not retire until the winter has decidedly set in, and its insect food has disappeared. Yet during the winter it will often rouse up and flit about, and that too during the middle of the day, as we have ourselves often witnessed. We have seen it abroad in November and December, though the weather was cold; and a friend shot one of these bats just before Christmas in the middle of the day, which, though the temperature was near or at the freezing point, was clear and bright. The noctule appears at the latter end of April, and seeks its winter dormitory in August. The

long-eared bat (*Plecotus auritus*) is active in the early part of October.

The various species of our bats differ more or less distinctly from each other in the style and character of their flight. The pipistrelle flits quickly, making abrupt and zigzag turns, and often skims near the ground; the noctule, which was first noticed as an English bat by White, sweeps high in the air on powerful wings, whence he termed it *altivolans*. On one occasion we saw three or four of this species wheeling round a row of sycamore-trees in Kent, uttering continually sharp grating cries. The chafer (*Melolontha vulgaris*) was at the same time flying about in great numbers, and no doubt proved a source of attraction to them. The flight of the long-eared bat is rapid, and it makes large circles, or courses to and fro like the swallow. In the aerial evolutions of the bats, the tail and membrane extending between the two hind limbs act as a rudder, enabling the animals to turn more or less abruptly: it would seem moreover that the tail is to a certain extent a prehensile organ. Mr. Bell, who first noticed the circumstance, observes that a small portion of the tail in most of our bats is exerted beyond the margin of the interfemoral membrane, and in ascending or descending any rough perpendicular surface this little caudal finger hooks upon such projections as occur, so as to add to the creature's security. When a bat traverses the wires of a cage this action of the tail is particularly conspicuous.

White observes that it is a common notion that bats will descend chimneys "and gnaw men's bacon," and adds that the story is by no means improbable, as a tame bat did not refuse raw flesh, though insects seemed to be most acceptable. The common bat often enters larders, and has been seen clinging to a joint of meat in the act of making a hearty meal upon it. Of this circumstance we are assured by Mr. Bell.

That bats can be tamed is a remarkable fact; but various species differ in the degrees of their docility. Mr. White's bat, a pipistrelle, was so tame that it would take flies out of a person's hand. "If you gave it anything to

eat, it brought its wings round before the mouth, hovering, and hiding its head in the manner of birds of prey when they feed. The adroitness it showed in shearing off the wings of the flies, which were always rejected, was worthy of observation, and pleased me much."

In the 'Proceedings of the Zoological Society' for 1834 we find the following interesting details relative to the habits of the pipistrelle in captivity, by Mr. G. Daniell. In July, 1833, he received five specimens of this little bat from Elvetham, Hampshire; all were females, and pregnant. "They had been kept in a tin powder-canister for several days, and, on being turned loose into a common packing-case with a few strips of deal nailed over it to form a cage, they exhibited much activity, progressing rapidly along the bottom of the box, ascending the bars to the top, and then throwing themselves off as if endeavouring to fly. They ate flies when offered to them, seizing them with the greatest eagerness, and devouring them greedily, all of them congregating together at the end of the box at which they were fed, crawling over, snapping at, and biting each other, at the same time uttering a grating kind of squeak. Cooked meat was next presented to them, and rejected; but raw beef was eaten by them with avidity, and with an evident preference for such pieces as had been moistened with water. This answered a double purpose: the weather being warm, numbers of blue-bottle flies (*Musca vomitoria*, Linn.) were attracted by the meat, and on approaching within range of the bat's wings were struck down by their action, the animal itself falling at the same moment with all its membranes expanded, and cowering over the prostrate fly, with its head thrust under, in order to secure its prey. When the head was again drawn forth the membranes were immediately closed, and the fly was observed to be invariably taken by the head. Mastication appeared to be a laboured occupation, consisting of a succession of eager bites or snaps, the sucking process (if it may be so termed) by which the insect was drawn into the mouth being much assisted by the looseness of the lips. Several

minutes were employed in devouring a large fly. In the first instance the flies were eaten entire, but Mr. Daniell afterwards observed detached wings in the bottom of the box. These, however, he never saw rejected, and he is inclined to think that they are generally swallowed. A slice of beef attached to the side of the box was found not only to save trouble in feeding, but also, by attracting the flies, to afford good sport in observing the animals obtain their food by this new kind of bat-fowling. Their olfactory nerves appear to be very acutely sensible. When hanging by their posterior extremities and attached to one of the bars in front of the cage, a small piece of beef at a little distance from their noses would remain unnoticed; but when a fly was placed in the same situation, they would instantly begin snapping at it. The beef they would eat when hungry, but they never refused a fly. In the daytime they often clustered together in a corner, but towards the evening they became very lively, and gave rapid utterance to their harsh grating notes. One of them died on the fifth day after they came into Mr. Daniell's possession, two on the fourteenth, the fourth survived until the eighteenth, and the fifth until the nineteenth day." Each was found to contain a single young one. On the 16th of May, 1834, the same gentleman procured five specimens of the noctule bat, four females and a male. The latter, which died in two days, was very impatient of confinement, restless and savage, snapping at the females and breaking his teeth in his attempts to escape by biting the wires of the cage. He constantly rejected food. The females were also at first sulky, but in about two days began to eat, preferring small bits of beef to flies, beetles, or gentles. In the course of a few days three of these died, each found to be pregnant with a single offspring. The survivor lived for more than a month, and fed in preference upon the hearts and livers of fowls: she rejected large flies, but partially devoured one or two chafers (*Melolontha vulgaris*). In taking food, it was remarked that the wings were not thrown forward as in the pipistrelle, the food being seized with an action similar to that of a

dog. The water that drained from the food was lapped, but the noctule did not raise its head in drinking as the pipistrelle was observed to do. This noctule took great pains in cleansing herself: she used the hinder limbs as combs, parting the hair on either side from head to tail, and forming a straight line down the middle of the back. The membrane of the wings was cleaned by the creature's nose, which it forced through the folds so as to expand them. During her captivity she brought forth a single offspring perfectly destitute of hair and blind: this she wrapped up so closely as to prevent any observation being made. In the evening of the day after giving birth to her offspring she died. But the young one was alive, and attached to the teat of the mother; whence it was removed, wrapped in warm flannel, and fed with milk, which it took from a sponge. It survived eight days, at which time its eyes had not opened, and it had acquired very little hair. The long-eared bat seems to be far more docile than the noctule. In captivity this elegant species is confident and familiar, very careful in cleaning its fur, and enjoying to gambol and play with others of its species, pretending to bite as we see dogs do when in good-humoured sport. Mr. Bell informs us that Mr. James Sowerby possessed a long-eared bat, which when at liberty in the parlour would come to the hand of those who held a fly towards it, and take the insect without hesitation. "If the insect were held between the lips, the bat would then settle on its young patron's cheek, and take the fly with great gentleness from the mouth; and so far was this familiarity carried, that, when either of my young friends made a humming noise with the mouth in imitation of an insect, the bat would search about the lips for the promised dainty."

The barbastelle (*Vespertilio barbastellus*, Linn.) is timid and restless, and very impatient of confinement. This bat seems to become torpid more readily than most of our British bats, and also more completely so. The reddish-gray bat (*Vespertilio nattereri*) was found by Mr. Bell to be very familiar and confiding, readily taking food from the hand; while the whiskered bat (*V. mysta-*

cinus) is timid and restless, and, refusing food, soon dies after its capture. The barbastelle, the long-eared bat, and the two last mentioned, often hybernate in caverns. Mr. Bell's specimens were found with others in a large chalk cavern in Kent excavated at the bottom of a shaft seventy feet deep.

With regard to the senses possessed by these interesting animals, the sight is quick, and the position of the eyes, which are small, but bright, is favourable for the chase and accurate seizure of insects during rapid flight. Of the peculiarities of their organs of smell, hearing, and feeling, we have treated at page 185 *et seq.*

Full, then, of interest is the history of our British bats, of which we have selected a few details. To watch their ways and actions, what time evening assumes "her gradual dusky veil," when the silence of the tranquil scene is unbroken, save by their sharp reiterated cry, the churr of the goatsucker, and drowsy hum of the shard-borne beetle, is alike pleasing to the contemplative man and the naturalist.

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